Op Test No.: NRC	Scenario # 3	Event # 3	Page 18 of 77
Event Description:	Trip of Running CCW Pump, 'A'		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator insert Trigger 3 Trip of the "A" CCW Pump**
Evaluator Note:		**This event is a trip of the running 'A' CCW Pump. The standby 'B' CCW Pump fails to Auto Start due to a pressure transmitter failure. The 'B' CCW will start manually when operated from the MCB. The crew should recognize the loss and enter AOP-014, Loss of Component Cooling Water. AOP-014 will direct the restoration of the CCW system.**
Available Indications		**Multiple CCW alarms on ALB-005**
AOP-014	SRO	ENTER AOP-014, Loss of Component Cooling Water No Immediate Actions
Procedure Note:		This procedure contains no immediate actions. Loss of CCW may require implementation of the SHNPP Emergency Plan.
	SRO	Directs SM to REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Matrix.
	SRO	EVALUATE plant conditions AND GO TO the appropriate section. (Section 3.3, Loss of a CCW Pump)
Procedure Note:		The standby CCW pump starts at 52 psig discharge pressure.
	RO	CHECK the standby CCW pump has STARTED. (NO) Dispatch an operator to investigate
Simulator Communicator:		**If dispatched to the field to investigate report back after 2-3 minutes that 'A' CCW Pump breaker is tripped on overcurrent on "C" Phase.**

Op Test No.: NRC	Scenario # 3	Event # 3	Page 19 of 77
Event Description:	Trip of Running CCW Pump, 'A'		

Time	Position	Applicant's Actions or Behavior
	RO	START the standby CCW pump.
	RO	CHECK ALL RCPs operating within the limits of Attachment 1. (YES)
	RO	CHECK CCW header pressure greater than 52 psig. (YES)
	RO	VERIFY adequate ESW cooling water flow to the associated CCW heat exchanger. (YES)
	RO	CHECK RHR operating. (NO)
	SRO	REFER TO Technical Specification 3.7.3 • With only one component cooling water flow path OPERABLE. restore at least two flow paths to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
	SRO	CONTACT Maintenance to determine the cause of the CCW pump failure, AND INITIATE corrective action.
	SRO	CHECK with Operations Staff to determine the desirability of using the swing CCW pump.
	SRO	CHECK CCW flow RESTORED to the affected train.
	Crew	May dispatch Aux Operator to Open the control power knife switch for the 'A' CCW pump.
Simulator Communicator / Operator		**Acknowledge request.** **Open control power knife switch on 'A' CCW pump then contact MCR that control power has been removed.**

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	20 of 77
Event Description:	Trip of Running CCW Pump, 'A'						
Time	Position	Applicant's Actions or Behavior					

Evaluator Note:		**Crew may implement OWP-CC at this point. This OWP will have the crew verify the ESF Status Light Boxes.** **The implementation of the OWP is not required to continue with the scenario.**
	SRO	EXIT this procedure.
Lead Evaluator:		**Once the plant has stabilized and Tech Specs have been evaluated, cue Event 4 Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC**

Op Test No.: NRC	Scenario # 3	Event # 4	Page 21 of 77
Event Description:	Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator insert Trigger 4 Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC**
Evaluator Note:		**Breaker 105 will trip open de-energizing bus 1A-SA. The "A" EDG will start supplying power to the bus and the loss of power sequencer will start appropriate equipment.**
Indications Available:		• Identifies multiple MCB alarms and a partial loss of lighting in the MCR • Identifies "A" sequencer in operation
	Crew	Diagnosis BKR 105 open with 106 closed and then 'A' EDG carrying the 1A-SA bus
	Crew	Identifies entry conditions are met to AOP-025
AOP-025		Loss of One Emergency AC Bus (6.9KV) or One Emergency DC Bus (125V)
Evaluator Note:		**The crew should NOT perform the immediate action RNO of "isolating letdown" since guidance is provided in AOP-025 Basis Document stating that this should only be done if the seqencer does not start the CSIP. IF letdown is secured the crew will have to restore letdown IAW OP-107.**
Immediate Action	RO	CHECK ANY CSIP RUNNING. (NO) – Does not isolate letdown
	SRO	Enters AOP-025 Makes Plant PA announcement for AOP entry

Op Test No.: NRC	Scenario # 3	Event # 4	Page 22 of 77
Event Description:	Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		Step 1 is an immediate action.
	RO	Check any CSIP running (YES – started by sequencer)
	BOP	VERIFY at least one Emergency AC Bus is ENERGIZED (YES both Emergency Buses are energized)
Procedure Note:		Loss of electrical power may require initiation of the Emergency Plan.
	SRO	REFER TO PEP-110, Emergency Classification and Protective Action Recommendations, and ENTER EAL Matrix.
	SRO	a. Refers to T.S. 1. T.S. 3.0.3 due to loss of 2/4 containment radiation monitors and CVIS affect on CNMT vacuum relief – 1 hour to initiate actions or be in HSB within next 6 hours 2. T.S. 3.3.3.1 due to inop MCR OAI rad monitors 3. TS 3.8.1.1 one off site circuit inoperable – perform surveillance with 1 hour and restore within 72 hours 4. TS 3.8.3.1 one required divisions of AC ESF buses not fully energized – energize the division within 8 hours or be in HSB within the next 6 hours 5. TS 3.4.6.1 RCS leak detection due to RM 3502A inop (gaseous & particulate) – action c; operation may continue for 72 hrs provided grab samples at least once per 24 hrs and RCS inventory balance at least once per 8 hrs **Tech Spec 3.0.3 is the most limiting Tech Spec due to the isolation of CNMT vacuum relief valves caused by 2/4 Radiation monitors failing high after losing power.**

Op Test No.: NRC	Scenario # 3	Event # 4	Page 23 of 77
Event Description:	Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC		

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>SRO</td><td>GO TO the appropriate section for further actions as indicated in the following table:
<table>
<tr><th>IF:</th><th>GO TO SECTION</th><th>PAGE</th></tr>
<tr><td>Loss of 1A-SA Emergency AC Bus</td><td>Section 3.1</td><td>7</td></tr>
<tr><td>Loss of 1B-SB Emergency AC Bus.</td><td>Section 3.2</td><td>25</td></tr>
<tr><td>Loss of DP-1A-SA Emergency DC Bus.</td><td>Section 3.3</td><td>42</td></tr>
<tr><td>Loss of DP-1B-SB Emergency DC Bus.</td><td>Section 3.4</td><td>46</td></tr>
</table>
Determines that Section 3.1 is appropriate</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>BOP</td><td>CHECK EDG A is RUNNING PROPERLY:
• Voltage - normal range (YES)
• Frequency - normal range (YES)</td></tr>
<tr><td></td><td>BOP</td><td>CHECK Bus 1A-SA is ENERGIZED (YES)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>RO</td><td>CHECK ESW A header cooling water flow:
• ESW A Pump is RUNNING (YES)
OR
• NSW flow in ESW A header (NO)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="2">Procedure Caution:</td><td>The operator should allow the sequencer to complete its cycle prior to attempting to start any large electrical loads including loads the sequencer may have failed to start.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>RO</td><td>CHECK ANY CSIP – RUNNING (YES)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="2">Procedure Caution:</td><td>• RCPs are restricted to a maximum run time of ten minutes without cooling water to the oil coolers.
• If both trains of CCW were in service supporting RHR operations, do not attempt to manually realign the CCW Non - Essential Header without consideration of creating CCW Pump runout conditions.</td></tr>
</table>

Op Test No.: NRC	Scenario # 3	Event # 4	Page 24 of 77
Event Description:	Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC		

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY A Train CCW – SUPPLYING the Non-Essential Header: • VERIFY A Train CCW Pump – RUNNING (YES) • CHECK 1CC-99, CCW HEAT EXCHANGER A TO NONESSENTIAL SUP – OPEN (YES) • CHECK 1CC-128, CCW NONESSENTIAL RETURN TO A HEADER – OPEN (YES) VERIFY B Train CCW – SUPPLYING the Non-Essential Header: • VERIFY B Train CCW Pump – RUNNING (YES) • CHECK 1CC-113, CCW HEAT EXCHANGER B TO NONESSENTIAL SUP – OPEN (YES) • CHECK 1CC-127, CCW NONESSENTIAL RETURN TO B HEADER – OPEN (YES)
Procedure Note:		1CC-252 will automatically shut if flow exceeds 198 gpm for greater than 3 seconds. This is indicated by receipt of ALB-005/1-2A, RCP THERM BAR HDR HIGH FLOW, and may be caused by auto start of the standby CCW Pump.
	RO	CHECK 1CC-252, THERMAL BARRIERS FLOW CONTROL FCV-685), is OPEN (YES)
	RO	VERIFY Charging and Letdown flow per OP-107, Chemical and Volume Control System, to maintain Pressurizer level. (Normal flow rate and Pressurizer level normal)
Procedure Caution:		• Due to the single shot circuitry, any TDAFW Pump steam supply valve shut in the following step (while any of the three start signals are still present) will not automatically re-open if an AFW actuation is received. TDAFW FCVs do not receive auto-open signals. • Stopping a MDAFW Pump powered by the EDG or shutting a MDAFW FCV will block further automatic actuations until the original condition for pump start is cleared.

Op Test No.:	NRC	Scenario #	3	Event #	4	Page	25 of 77
Event Description:	Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC						

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**If the crew secures TDAFW pump or adjusts flow, they should recognize the pump remains operable.**
	BOP	CONTROL AFW as necessary to maintain reactor power and S/G levels. (Controls AFW flow to maintain Rx power and SG levels)
Evaluator Note:		**IF the crew does not identify that AH-9A did not re-start 'A' *CSIP will become inoperable based on OWP-ECW-01 for not maintaining the CSIP ventilation available and PLP-114 Attachment 4, Area Temperature Monitoring.*** ***A high room temperature of 124°F (104°F + 20°F) could also make the CSIP inoperable.***
	BOP	VERIFY ventilation support equipment for operating CSIP is IN SERVICE: • P-4 Pump (YES) • WC-2 Chiller (YES) • CSIP Room HVAC **(NO)** **Informs CRS that the 'A' CSIP Room HVAC did not restart to support 'A' CSIP operation and starts AH-9A SA**
	RO	CHECK Instrument Air pressure ≥ 90 psig. (YES)
	BOP	CHECK at least two (2) CRDM Fans operating (YES)
	RO	CHECK RHR operation was in progress (NO)
Evaluator Note:		OMM-004 Attachment 12 is included at the back of this guide see page 59.
	BOP	VERIFY proper load sequencing per OMM-004, Post Trip/Safeguards Review, Attachment 12.

Op Test No.: NRC	Scenario # 3	Event # 4	Page 26 of 77
Event Description:	Loss of 1A-SA Emergency Bus with failure of CSIP 'A' Room HVAC		

Time	Position	Applicant's Actions or Behavior
	BOP	CHECK A Sequencer Load Block 9 AUTO ACT COMPLETE MAN LOAD PERMITTED light is LIT. (YES)
Procedure Note:		Re-energizing 480V Emergency Bus 1A1 will restore power to the following: • PZR PORV Block Valves • Air Compressor 1A (Compressor will not auto start) • NNS 125V Battery Charger 1A and 1B • PZR Heater Bank A
	BOP	RE-ENERGIZE 480V Emergency Bus 1A1
Lead Evaluator:		**After 480 V Emergency Bus 1A1 is restored cue event 5 "SG 'C' PORV Pressure Instrument fails high and the PORV stays OPEN – requires crew to reduce power to < 100% IAW AOP-042**

Op Test No.: NRC	Scenario # 3	Event # 5	Page 27 of 77
Event Description:	SG 'C' PORV Press Inst fails high w/ PORV staying OPEN – AOP-042		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator insert Trigger 5** **SG 'C' PORV Press Inst fails high w/ PORV staying OPEN – requires entry into AOP-042**
Evaluator Note:		**This event is a Steam Generator PORV Pressure Instrument failing high. This will require the BOP to take manual control of the PORV to shut it. The SRO should evaluate Tech Specs 3.3.3.5, Remote Shutdown System, and 3.6.3, Containment Isolation Valves.**
Available Indications:		• **ALB-014-8-5, Computer Alarm Steam Generators** • **Control Rods will withdraw due to lower RCS temperature**
ALB-014	SRO	ENTERS APP-ALB-014-8-5
	BOP	IDENTIFIES 'C' SG PORV is OPEN
	BOP	DEPRESS Manual Pushbutton for PK-308C1 to take manual control of 'C' SG PORV
	SRO	Provide pressure band for PORV manual control (Maintain < 1170 psig).
	BOP	LOWER output for PK-308 to SHUT 'C' SG PORV 1MS-82 (PORV will NOT shut) Informs CRS that 'C' SG PORV is failed OPEN
	SRO	Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist for the failure of PT-308B. Contacts WCC and support personnel for repairs.
Simulator Communicator:		**IF contacted to isolate 'C' PORV locally then acknowledge the request.**

Op Test No.: NRC	Scenario # 3	Event # 5	Page 28 of 77
Event Description:	SG 'C' PORV Press Inst fails high w/ PORV staying OPEN – AOP-042		

Time	Position	Applicant's Actions or Behavior
	CREW	Identifies entry conditions met for AOP-042
AOP-042		Secondary Steam Leak/ Efficiency Loss
Procedure Note:		This procedure contains no immediate actions.
	SRO	CHECK that the plant can be operated safely: • CHECK ALL Reactor Protection parameters WITHIN TRIP LIMITS. (YES) • CHECK Turbine Building envelope safe for personnel entry. (YES)
	BOP	CHECK a steam leak exists. (YES – 'C' SG PORV is OPEN)
	SRO	NOTIFY personnel of evacuation requirements. (NONE)
	SRO	REFER TO PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Matrix.
Procedure Note:		Initial target reduction may be up to 100 MW less than current REFERENCE value and may be changed as necessary to reduce power to less than 100%.
	CREW	DETERMINE the required megawatt change needed for the power reduction. (_____ power reduction.)
	BOP	NOTIFY Load Dispatcher that the Unit is reducing load.

Op Test No.: NRC	Scenario # 3	Event # 5	Page 29 of 77
Event Description:	SG 'C' PORV Press Inst fails high w/ PORV staying OPEN – AOP-042		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		• If load reduction rates in excess of 45 MW/min are required, the Unit should be tripped. • If OSI-PI is available, VIDAR is functioning properly if the DEH_MEGAWATTS point is updating. (Attachment 1, Checking VIDAR Functioning, provides alternative methods of checking VIDAR functioning.)
Procedure Caution:		Failure of the DEH computer VIDAR Unit while in OPER AUTO has resulted in a plant trip.
	BOP	CHECK BOTH of the following: • DEH System in AUTO (YES) • VIDAR functioning properly (YES)
	BOP	PERFORM the following at the DEH panel: a. DEPRESS the LOAD RATE MW/MIN pushbutton. b. ENTER desired rate (NOT to exceed 45 MW/MIN) in DEMAND display. c. DEPRESS ENTER pushbutton. d. DEPRESS REF pushbutton. e. ENTER desired load in DEMAND display. f. DEPRESS ENTER pushbutton. g. CHECK HOLD pushbutton LIT.
	RO	CHECK Rod Control in AUTO. (YES)
Procedure Note:		During the load reduction, it is permissible to periodically move between GO and HOLD and to vary the load rate.
	BOP	COMMENCE turbine load reduction at the DEH panel: a. CHECK OPER AUTO Mode AVAILABLE. (YES) (1) DEPRESS GO pushbutton. (2) VERIFY the value in the REFERENCE display LOWERS VERIFY Generator load AND Reactor power LOWERING. (YES)

Op Test No.: NRC	Scenario # 3	Event # 5	Page 30 of 77
Event Description:	SG 'C' PORV Press Inst fails high w/ PORV staying OPEN – AOP-042		

Time	Position	Applicant's Actions or Behavior
	BOP	MAINTAIN Generator reactive load (VARs) within guidelines.
	RO	CHECK Tavg within 5°F of Tref.
	BOP	WHEN Reactor power is less than 100%, THEN DEPRESS the HOLD pushbutton.
	BOP	CHECK the HOLD pushbutton is LIT.
Lead Evaluator:		**When the crew identifies that Reactor power is < 100% AND the Turbine is placed to HOLD then inform the Simulator Operator to SHUT the 'C' SG PORV manual block valve (run trigger 15).**
Simulator Operator:		**WHEN DIRECTED by the Lead Examiner:** **After the crew has completed the ramp to reduce power to < 100% then CLOSE the 'C' PORV manual block valve.** **Run "Trigger 15" to close 1MS-63**
Simulator Communicator:		**Contact the MCR that 'C' PORV has been isolated.**
Lead Evaluator:		**Once the plant has stabilized, cue Event 6, SG 'C' Tube Rupture**

Op Test No.: NRC	Scenario # 3	Event # 6	Page 31 of 77
Event Description:	'C' SG Tube Rupture		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator, initiate Trigger 6 SGTR on 'C' SG at 200 gpm**
Evaluator Note:		**This is the start of the major events, a tube rupture in the 'C' SG (SGTR) at 200 gpm. The crew should recognize the presence of a large leak in the primary. After determining that this leak is greater than makeup capability they should trip the Reactor, manually initiate Safety Injection, and carry out actions per E-0.** **Once the Reactor is tripped a Main Steam Line break outside Containment will occur. MSIV auto isolation is defeated. The crew will transition from E-0 to E-3 to address the ruptured SG. At some point the Faulted SG will become apparent and the crew is expected to manually isolate the 'C' SG in E-2.** **Depending on crew's pace through the procedure they may isolate the 'C' SG prior to entering E-3. The Scenario Guide is written to support either implementation.**
Available Indications:		• **Charging Flow increasing** • **VCT Level decreasing** • **Pressurizer Level and Pressure decreasing** • **'C' MSL Rad monitor**
AOP-016	SRO	ENTERS AOP-016, Excessive Primary Plant Leakage
Procedure Note:		**This procedure contains no immediate actions.**
	RO	CHECK RHR in operation. (NO)
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Matrix.
	RO	CHECK RCS leakage within VCT makeup capability. (NO)

Op Test No.: NRC	Scenario # 3	Event # 6	Page 32 of 77
Event Description:	'C' SG Tube Rupture		

Time	Position	Applicant's Actions or Behavior
	SRO	Directs manual Reactor Trip and Safety Injection activation
	CREW	PERFORM the following: TRIP the Reactor, AND GO TO EOP-E-0. (Perform RNO substeps 4.b. and 4.c as time permits)
Procedure Note:		**If SI Actuation is required, the Reactor and Turbine should be verified tripped in E-0 before manually actuating SI.**
	RO	MANUALLY INITIATE Reactor Trip and Safety Injection.
	SRO	EXIT this procedure.

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	33	of	77
Event Description:			'C' SG Tube Rupture						

Time	Position	Applicant's Actions or Behavior
E-0	SRO	Steps through immediate actions with crew Makes plant PA announcement
Immediate Action	RO	Verifies Reactor is Tripped (YES) REACTOR TRIP CONFIRMATION Reactor Trip AND Bypass BKRs - OPEN Rod Bottom Lights (Zero Steps) - LIT Neutron Flux - DROPPING
Immediate Action	BOP	Verifies Turbine is Tripped – All throttle valves shut (YES) TURB STOP VLV 1 TSLB-2-11-1 TURB STOP VLV 2 TSLB-2-11-2 TURB STOP VLV 3 TSLB-2-11-3 TURB STOP VLV 4 TSLB-2-11-4
Immediate Action	BOP	Verify Power To AC Emergency Buses (YES) AC emergency buses – BOTH energized • 'A' bus powered by 'A' EDG • 'B' bus powered by Offsite

Op Test No.: NRC	Scenario # 3	Event # 6	Page 34 of 77
Event Description:	'C' SG Tube Rupture		

Time	Position	Applicant's Actions or Behavior
Immediate Action	RO	Safety Injection Activated (NO - Activates) Both Trains BPLP 4-1,"SI ACTUATED" - LIT (CONTINUOUSLY)
	SRO	Assigns foldout items of E-0 to both the RO and BOP • RO: o RCP Trip criteria o Alternate Miniflow Open/Shut criteria o RHR restart criteria • BOP o Ruptured SG AFW Isolation criteria o AFW supply switchover criteria

Op Test No.: NRC	Scenario # 3	Event # 6	Page 35 of 77
Event Description:	'C' SG Tube Rupture		
Time	Position	Applicant's Actions or Behavior	

Evaluator Aide: E-0 foldout

REACTOR TRIP OR SAFETY INJECTION

FOLDOUT

- **RCP TRIP CRITERIA**

  IF both of the following occur, THEN stop all RCPs:

  - SI flow - GREATER THAN 200 GPM
  - RCS pressure - LESS THAN 1400 PSIG

- **ALTERNATE MINIFLOW OPEN/SHUT CRITERIA**

  - IF RCS pressure drops to less than 1800 PSIG, THEN verify alternate miniflow isolation **OR** miniflow block valves - SHUT
  - IF RCS pressure rises to greater than 2200 PSIG, THEN verify alternate miniflow isolation **AND** miniflow block valves - OPEN

- **RHR RESTART CRITERIA**

  IF RCS pressure drops to less than 230 PSIG in an uncontrolled manner, THEN restart RHR pumps to supply water to the RCS.

- **RUPTURED SG AFW ISOLATION CRITERIA**

  IF all of the following occur to any SG, THEN stop feed flow by shutting the isolation valves (preferred) OR flow control valves to that SG:

  - Any SG level rises in uncontrolled manner OR has abnormal secondary radiation
  - Narrow range level - GREATER THAN 25% [40%]

- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

Op Test No.: NRC	Scenario # 3	Event # 6	Page 36 of 77
Event Description:	'C' SG Tube Rupture		

Time	Position	Applicant's Actions or Behavior
	SRO	Evaluate EAL Matrix.
	RO	Verifiy CSIPs – all running (YES) 'A' and 'B' running
	RO	Verify RHR Pumps – all running (YES) 'A' and 'B' running
	RO	Safety Injection flow > 200 gpm (YES) RCS pressure - > 230 PSIG (YES)
	RO	Both RHR HX header flows - >1000 gpm (NO) Verify RHR valves properly aligned: RWST to RHR pump suction valves – OPEN 1SI-322 (YES) 1SI-323 (YES) RHR HX outlet valves – OPEN 1RH-30 (YES) 1RH-66 (YES) Verify low head SI to cold leg valves – OPEN 1SI-340 (YES) 1SI-341(YES)
	BOP	Locally Unlock AND Turn ON The Breakers For The CSIP Suction AND Discharge Cross-connect Valves: Refer to Attachment 2
Simulator Communicator / Simulator Operator		**Acknowledge communications:** **Run CAEP :\cvc\path-1 att 6 csip suction valves power.txt.** **When the CAEP is complete, report completion to the MCR.**

Op Test No.: NRC	Scenario # 3	Event # 6	Page 37 of 77
Event Description:	'C' SG Tube Rupture		

Time	Position	Applicant's Actions or Behavior
	BOP	Main Steam Line Isolation – Actuated (NO) MAIN STEAM LINE ISOLATION ACTUATION CRITERIA CNMT pressure - GREATER THAN OR EQUAL TO 3.0 PSIG Any SG pressure - LESS THAN OR EQUAL TO 601 PSIG MANUAL - DEGRADATION TOWARDS AUTOMATIC ACTUATION
	BOP	Verify All MSIVs AND Bypass Valves – SHUT (YES)
	BOP	Any SG pressure - 100 PSIG LOWER THAN PRESSURE IN TWO OTHER SGs (NO)
	RO	Check CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG (YES)
Critical Task #1	BOP	Verify AFW flow - AT LEAST 210 KPPH ESTABLISHED (NO) Identifies that the TDAFW pump has tripped and 'A' MDAFW pump failed to auto start. Informs crew and starts the 'A' MDAFW pump Critical task - Start the 'A' MD AFW Pump to prevent a Loss of Heat Sink and entry into FR-H.1
Simulator Communicator:		**If contacted by the crew to investigate the TDAFW pump trip report back after 3 minutes that the indications locally look normal. But the trip linkage is tripped.** **IF asked to reset – acknowledge – wait ~ 2 minutes and report back that the trip linkage has come apart and the TDAFW pump trip cannot be reset. You will contact Maintenance and the WCC for help.**

Op Test No.: NRC	Scenario # 3	Event # 6	Page 38 of 77
Event Description:	'C' SG Tube Rupture		

Time	Position	Applicant's Actions or Behavior
	BOP	Sequencer Load Block 9 Actuated / Both Trains (YES)
	BOP	Energize AC buses 1A1 AND 1B1
Evaluator Note:		**E-0, Attachment 3 is located in the back of this guide.**
Evaluator Note:		**E-0 Attachment 3 is included in the back of this scenario.** **The RO will perform all board actions until the BOP completes Attachment 3. The BOP is permitted to properly align plant equipment IAW E-0 Attachment 3 without SRO approval.** **The Scenario Guide still identifies tasks by board position because the time frame for completion of Attachment 3 is not predictable.**
	BOP	Verify Alignment Of Components From Actuation Of ESFAS Signals Using Attachment 3, "Safeguards Actuation Verification", While Continuing With This Procedure.
	BOP	**Directs AO to place 1A and 1B Air Compressor in the local control mode per E-0 Attachment 3 step 22**
Simulator Communicator		**Acknowledge the request to place 1A and 1B Air Compressor in the local control mode per E-0 Attachment 3 step 22**
Simulator Operator		**When directed to place the 1A and 1B Air Compressor in the local control mode:** **Run APP\air\acs_to_local**
Simulator Communicator		**When the APP for 1A and 1B Air Compressor has completed running call the MCR and inform them that the air compressors are running in local control.**

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	39	of	77
Event Description:			'C' SG Tube Rupture						

Time	Position	Applicant's Actions or Behavior
	RO	Stabilize AND Maintain Temperature Between 555°F AND 559°F Using Table 1.

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DROPPING	GREATER THAN 557°F AND RISING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 210 KPPH until level greater than 25% [40%] in at least one on intact SG • IF cooldown continues, THEN, shut MSIVs AND BYPASS valves	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser - OR - • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F

	RO	PRZ PORVs – SHUT (YES) PRZ Spray Valves – SHUT (YES) PRZ PORV Block Valves - AT LEAST ONE OPEN (YES)

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	40	of	77
Event Description:			'C' SG Tube Rupture						

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**The SG Tube Rupture, Reactor trip, and Safety Injection can mask the indications for the Steam Line break. If the crew identifies the fault at this point then they will transition to E-2 now to isolate 'C' SG. If not then later in the scenario Foldout Criteria in E-3 will send them to E-2. E-2 steps are included in this Guide.**
	RO/BOP	Identify Any Faulted SG: Check for any of the following: • Any SG pressures - DECREASING IN AN UNCONTROLLED MANNER (NO) • Any SG – COMPLETELY DEPRESSURIZED (NO)
	RO/BOP	Identify Any Ruptured SG: • Any SG - ABNORMAL RADIATION OR UNCONTROLLED LEVEL RISE (YES)
	SRO	Ruptured SG – IDENTIFIED (YES, 'C')
Event 7 Critical Task #2	SRO / BOP	Check Feed Flow To Ruptured SG(s) – ISOLATED (NO) Critical Task - Isolate AFW flow to the ruptured 'C' SG prior to entering ECA 3.1, SGTR with Loss of Reactor Coolant: Subcooled Recovery
	SRO	GO TO E-3, "STEAM GENERATOR TUBE RUPTURE", Step 1.

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	41	of	77
Event Description:			'C' SG Tube Rupture						

Time	Position	Applicant's Actions or Behavior
E-3		Steam Generator Tube Rupture
Evaluator Note:		**At some point the steam break will become apparent. When it does the crew will transition to E-2 from the foldout criteria.**
Procedure Note:		Foldout applies
	SRO	Assigns foldout items of E-3 to both the RO and BOP • RO: o Alternate Miniflow Open/Shut criteria o RHR restart criteria o SI Reinitiation criteria o Cold Leg Recirculation Switchover criteria • BOP o Secondary Integrity criteria o Multiple Tube Rupture criteria o AFW supply switchover criteria
	SRO	Implement Function Restoration Procedures As Required.

Op Test No.: NRC	Scenario # 3	Event # 6	Page 42 of 77
Event Description:	'C' SG Tube Rupture		
Time	Position	Applicant's Actions or Behavior	

Evaluator Aide: E-3 Foldout

FOLDOUT

- **ALTERNATE MINIFLOW OPEN/SHUT CRITERIA**
  - **IF** RCS pressure drops to less than 1800 PSIG, **THEN** verify alternate miniflow isolation **OR** miniflow block valves - SHUT
  - **IF** RCS pressure rises to greater than 2200 PSIG, **THEN** verify alternate miniflow isolation **AND** miniflow block valves - OPEN
- **RHR RESTART CRITERIA**

  IF RCS pressure drops to less than 230 PSIG in an uncontrolled manner, **THEN** restart RHR pumps to supply water to the RCS.
- **SI REINITIATION CRITERIA**

  IF any of the following occurs:
  - RCS subcooling - LESS THAN 10° F [40° F] - C
    20° F [50° F] - M
  - PRZ level - CAN **NOT** BE MAINTAINED GREATER THAN 10% [30%]

  THEN perform the following:

  a. IF CSIP suction aligned to VCT, **THEN** realign to RWST.

  b. Shut charging line isolation valves **AND** open BIT valves.

  c. Verify normal miniflow isolation valves - SHUT

  d. **IF** necessary to restore conditions, **THEN** restart standby CSIP.

  e. **IF** reinitiation occurs after Step 76, **THEN GO TO** ECA-3.1, "SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY", Step 1.
- **COLD LEG RECIRCULATION SWITCHOVER CRITERIA**

  IF RWST level drops to less than 23.4% (2/4 Low-Low alarm), **THEN** GO TO ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.
- **SECONDARY INTEGRITY CRITERIA**

  IF any of the following occurs, **THEN** GO TO E-2, "FAULTED STEAM GENERATOR ISOLATION", Step 1 (unless faulted SG is needed for RCS cooldown).
  - Any SG pressure - DROPS IN AN UNCONTROLLED MANNER **AND** THAT SG HAS **NOT** BEEN ISOLATED
  - Any SG - COMPLETELY DEPRESSURIZED **AND** THAT SG HAS **NOT** BEEN ISOLATED
- **MULTIPLE TUBE RUPTURE CRITERIA**

  IF any intact SG level rises in an uncontrolled manner **OR** any intact SG has abnormal radiation levels, **THEN** stop RCS depressurization and cooldown AND GO RETURN TO Step 1.
- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, **THEN** switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

Op Test No.: NRC	Scenario # 3	Event # 6	Page 43 of 77
Event Description:	'C' SG Tube Rupture		
Time	Position	Applicant's Actions or Behavior	

	RO	Check RCP Trip Criteria:
		• Any RCP – RUNNING (YES)
Procedure Note:		The RCP Trip Criteria is in effect until an RCS cooldown is initiated.
	RO	Check all of the following: • SI flow – GREATER THAN 200 GPM (YES) • Check RCS pressure – LESS THAN 1400 PSIG (NO)
	BOP	Check Rupture SG(s) - IDENTIFIED: **Ruptured SG Identification (Any of the following)** SG level - RISING IN AN UNCONTROLLED MANNER SG Sample - HIGH RADIATION Main Steamlines - HIGH RADIATION • RM-01MS-3591 SB, Main Steam Line A • RM-01MS-3592 SB, Main Steam Line B • RM-01MS-3593 SB, Main Steam Line C SG level - INCREASING IN AN UNCONTROLLED MANNER (YES) SG activity sample - HIGH RADIATION Main steamline radiation - HIGH RADIATION (YES)

Op Test No.: NRC	Scenario # 3	Event # 6	Page 44 of 77
Event Description:	'C' SG Tube Rupture		

Time	Position	Applicant's Actions or Behavior
	BOP	Adjust Ruptured SG PORV Controller Setpoint To 88% (1145 PSIG) AND Place In AUTO. ('C' SG PORV is manually isolated)
	BOP	Check Ruptured SG PORV – SHUT (YES)
	BOP	Check Feed Flow To Intact SG(s) - AVAILABLE FROM MDAFW PUMP (YES 'A' MDAFW pump ONLY)
	BOP	Shut ruptured SG steam supply valve to TDAFW pump: • SG B: 1MS-70 • SG C: 1MS-72
	BOP	Verify blowdown isolation valves from ruptured SG – SHUT
	BOP	Shut ruptured SG main steam drain isolation before MSIV: • SG A: 1MS-231 • SG B: 1MS-266 • SG C: 1MS-301
	BOP	Shut ruptured SG MSIV AND bypass valve. (NO, 'C' MSIV fails to SHUT)
Evaluator Note:		**Indications of the Main Steamline Break should become identifiable and the crew should transition to E-2 using Foldout C, Secondary Integrity Criteria. E-3 continues later in this guide.** **The crew may also attempt a manual MSLI based on approaching ESF actuation criteria of any SG pressure less than or equal to 601 psig.**

Op Test No.:	NRC	Scenario #	3	Event #	9	Page	45	of	77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**								

Time	Position	Applicant's Actions or Behavior
E-2		Faulted Steam Generator Isolation
	SRO	SRO conducts an alignment brief for transition to E-2
Procedure Caution:		• **At least one SG must be maintained available for RCS cooldown.** • **Any faulted SG OR secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.**
	SRO	Initiate Monitoring Of Critical Safety Function Status Trees.
Critical Task #3	BOP/RO	Verify all MSIVs – SHUT Checks MSIVs AND Bypass Valves: • Verify all MSIVs – SHUT (NO, Shuts 'A' AND 'B' MSIV but 'C' MSIV fails to SHUT) Critical to shut 'A' and 'B' MSIV (these valves will not automatically shut from ESF MSLI signal. It is critical to shut them prior to exiting E-2. Perform the following: (to attempt to isolate 'C' MSIV) • Locally shut instrument air supply to RAB 261: 1IA-814 (north of AH-19 1A-SA) • Locally remove cap AND open drain valve: 1IA-1876 (located in corridor outside VCT valve gallery)
Communicator:		**Acknowledge request to vent air – stall if later asked what is taking you so long to get the air vented. Say you are working on it and if the MCR persists, state that you broke off the valve handwheel on 1IA-814 and you are going for pliers to close the valve.**
Simulator Operator:		**DO NOT vent Instrument Air – no actions are desired**

Op Test No.: NRC	Scenario # 3	Event # 9	Page 46 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Verify all MSIV bypass valves – SHUT (YES)
	BOP/RO	Check Any SG NOT Faulted: • Any SG pressure - STABLE OR INCREASING (YES)

	BOP/RO	Identify Any Faulted SG:
		• Check for any of the following:
		  • Any SG pressure - DECREASING IN AN UNCONTROLLED MANNER (YES)
		  • Any SG - COMPLETELY DEPRESSURIZED (NO)

	BOP/RO	Isolate Faulted SG(s): • Verify faulted SG(s) PORV – SHUT • Verify main FW isolation valves – SHUT • Verify MDAFW AND TDAFW pump isolation valves to faulted SG(s) – SHUT
		Shut faulted SG(s) steam supply valve to TDAFW pump – SHUT • SG C: 1MS-72 (SHUT)
		Verify main steam drain isolation(s) before MSIVs - SHUT: • SG A: 1MS-231 (SHUT) • SG B: 1MS-266 (SHUT) • SG C: 1MS-301 (SHUT)
		Verify SG blowdown isolation valves - SHUT
		Verify main steam analyzer isolation valves - SHUT
	BOP/RO	Check CST Level - GREATER THAN 10% (YES)
Procedure Note:		A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary leakage.

Op Test No.: NRC	Scenario # 3	Event # 9	Page 47 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Any SG - ABNORMAL RADIATION OR UNCONTROLLED LEVEL RISE
		Check for all of the following:
		• Condenser vacuum pump effluent radiation - NORMAL
		• SG blowdown radiation – NORMAL (NO)
		• Main steamline radiation – NORMAL (NO)
		• SG activity sample – NORMAL (WHEN AVAILABLE)
E-3	SRO	GO TO E-3
	SRO	Implement Function Restoration Procedures As Required.
Procedure Note:		**The RCP Trip Criteria is in effect until an RCS cooldown is initiated.**
	RO	CHECK RCP Trip Criteria: • Any RCP – RUNNING (YES) CHECK all of the following: • SI flow – GREATER THAN 200 GPM (YES) • CHECK RCS pressure – LESS THAN 1400 PSIG (NO)
	BOP	IDENTIFY Any Ruptured SG: CHECK for any of the following: • SG level - INCREASING IN AN UNCONTROLLED MANNER (YES) • SG activity sample - HIGH RADIATION • Main steamline radiation - HIGH RADIATION (YES)

Op Test No.: NRC	Scenario # 3	Event # 9	Page 48 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		• **At least one SG must be maintained available for RCS cooldown.** • **If the TDAFW pump is the only available source of feed flow, one steam supply valve from an intact SG must be maintained open.**
	BOP	ISOLATE Flow From Ruptured SG: ADJUST ruptured (C) SG PORV controller setpoint to 88% (1145 PSIG) AND place in auto.
	BOP	CHECK ruptured SG PORV – SHUT (YES)
	BOP	SHUT ruptured (C) SG steam supply valve to TDAFW pump: • SG C: 1MS-72
	BOP	VERIFY blowdown isolation valves from ruptured SG - SHUT
	BOP	Shut ruptured (C) SG main steam drain isolation before MSIV: • SG C: 1MS-301
	BOP	Shut ruptured SG MSIV AND bypass valve. (NO, 'C' MSIV fails to SHUT)
	BOP	Isolate Intact SG(s) From Ruptured SG AND Minimize Steam Flow From Ruptured SG: • Shut all remaining MSIV AND bypass valves. • Place both steam dump interlock bypass switches to OFF/RESET. • Use intact SG(s) PORV for all further steam dumping • Isolate steam release path from ruptured SG using Attachment 1. • Any intact SG MSIV AND bypass valve – SHUT (YES)

Op Test No.: NRC	Scenario # 3	Event # 9	Page 49 of 77
Event Description:	Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut		

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		**IF ruptured SG is faulted AND is NOT need for RCS cooldown, THEN feed flow to that SG should remain isolated.**
	BOP	Monitor Ruptured SG Level: • Ruptured SG – FAULTED (YES) • Ruptured SG - NEED FOR RCS COOLDOWN (NO) • Level - GREATER THAN 25% [40%] (NO) o Maintain feed flow to ruptured SG o When level > 25% [40%], THEN stop feed flow by shutting the MDAFW AND TDAFW isolation valves to ruptured SG.
Procedure Caution:		**The steam supply valve from the ruptured SG to the TDAFW pump should be shut OR isolated before continuing (unless this prevents feeding SGs to be used for cooldown).**
	BOP	Check Ruptured SG(s) Pressure - GREATER THAN 260 PSIG [350 PSIG] (NO/YES) If NO, then goto EOP-ECA-3.1.
Evaluator Note:		**Depending on the crew's pace through the procedures 'C' SG pressure may not be less than 260 psig at this point. If that's the case then the crew will continue in E-3 and later transition to** EOP-ECA-3.1
EOP-ECA-3.1	SRO	EOP-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT SUBCOOLED RECOVERY, Step 1
	SRO	SRO conducts an alignment brief for transition to ECA-3.1
	SRO	Foldout applies Assigns RO and BOP foldout items • RO – SI Reinitiation criteria, E-3 Transition criteria, Cold Leg Recirc Switchover criteria, RHR Restart criteria • BOP – Secondary Integrity criteria, AFW Supply Switchover criteria

Op Test No.: NRC	Scenario # 3	Event # 9	Page 50 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		
Time	Position	Applicant's Actions or Behavior	

Op Test No.:	NRC	Scenario #	3	Event #	9	Page	51	of	77
Event Description:		Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut							
Time	Position	Applicant's Actions or Behavior							

Evaluator Aide: EOP-ECA-3.1

SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY

FOLDOUT

- **SI REINITIATION CRITERIA**

  IF any of the following occurs:

  - RCS subcooling - LESS THAN 10° F [40° F] - C
    20° F [50° F] - M
  - PRZ level - CAN **NOT** BE MAINTAINED GREATER THAN 10% [30%]

  THEN perform the following:

  a. Shut charging line isolation valves **AND** open BIT valves.

  b. Verify normal miniflow isolation valves - SHUT

  c. **IF** necessary to restore conditions, **THEN** restart standby CSIP.

- **SECONDARY INTEGRITY CRITERIA**

  IF any of the following occurs, **THEN** GO TO E-2, "FAULTED STEAM GENERATOR ISOLATION", Step **1** (unless faulted SG is needed for RCS cooldown).

  - Any SG pressure - DROPS IN AN UNCONTROLLED MANNER **AND** THAT SG HAS **NOT** BEEN ISOLATED
  - Any SG - COMPLETELY DEPRESSURIZED **AND** THAT SG HAS **NOT** BEEN ISOLATED

- **E-3 TRANSITION CRITERIA**

  IF any intact SG level rises in an uncontrolled manner **OR** any intact SG has abnormal radiation levels, **THEN** stop RCS depressurization and cooldown **AND** GO TO E-3, "STEAM GENERATOR TUBE RUPTURE, Step **1**.

- **COLD LEG RECIRCULATION SWITCHOVER CRITERIA**

  IF RWST level drops to less than 23.4% (2/4 Low-Low alarm), **THEN** GO TO ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.

- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, **THEN** switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- **RHR RESTART CRITERIA**

  IF RCS pressure drops to less than 230 PSIG in an uncontrolled manner, **THEN** restart RHR pumps to supply water to the RCS.

Op Test No.: NRC	Scenario # 3	Event # 9	Page 52 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	RO	Reset SI.
	BOP	Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to E-0 GUIDE, Attachment 6.)
	RO	Reset Phase A AND Phase B Isolation Signals (Phase B has not actuated).
	RO	Establish Instrument Air AND Nitrogen To CNMT: Open the following valves: • 1IA-819 (locates MCB control switch and opens valve) • 1SI-287 (locates MCB control switch and opens valve)
	BOP	Monitor AC Buses: Check AC emergency buses 1A-SA AND 1B-SB – ENERGIZED BY OFFSITE POWER: • Check bus voltages • Check breakers 105 AND 125 – CLOSED NO – 1A bus is energized by 'A' EDG
	SRO	Check AC emergency buses 1A-SA OR 1B-SB – ENERGIZED BY OFFSITE POWER: • Check bus voltages • Check breakers 105 OR 125 – CLOSED YES – 1B bus is energized by Offsite power and breaker 125 is closed • Align AND monitor plant equipment referring to AOP-025, "LOSS OF ONE EMERGENCY AC BUS (6.9KV) OR ONE EMERGENCY DC BUS (125V)". Already performed
	BOP	Check all non-emergency AC buses – ENERGIZED (YES)

Op Test No.: NRC	Scenario # 3	Event # 9	Page 53 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	BOP	Check Ruptured SG(s) Level - LESS THAN 78% [60%] (High-High alarm) (YES)
Procedure Caution:		**PRZ heaters should NOT be energized until PRZ water level indicates greater than minimum recommended by plant operations staff to ensure heaters are covered.**
	RO	Secure PRZ Heaters: • Place backup heaters in the OFF position. • Verify control heaters - OFF • Consult plant operations staff for a recommended minimum indicated PRZ water level that will ensure heaters are covered. (Refer to ERG Executive Volume, Generic Issue: Evaluations by the Plant Engineering Staff.)
	RO	Check CNMT Spray Status: • Check any CNMT spray pump – RUNNING (NO)
Procedure Caution:		**IF ruptured SG is faulted AND is NOT need for RCS cooldown, THEN feed flow to that SG should remain isolated.**
	BOP	Monitor Ruptured SG Level: • Ruptured SG – FAULTED (YES) • Ruptured SG - NEEDED FOR RCS COOLDOWN (NO) o Verify feed flow isolated to ruptured SG (YES)
	RO	Check RHR Pump Status: • Check RHR pump suction - ALIGNED TO RWST (YES) • RCS pressure - GREATER THAN 230 PSIG (YES) • RCS pressure - STABLE OR INCREASING (YES) o Stop RHR pumps (locates MCB controls and stops both RHR pumps)

Op Test No.: NRC	Scenario # 3	Event # 9	Page 54 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	SRO	**(NOTE: The SRO should opt to circle this step and move on, BUT, if candidate directs this step it is written out below)** Consult plant operations staff for a recommended minimum indicated PRZ water level that will ensure heaters are covered. Coordinate With Plant Operations Staff AND Chemistry To Perform The Following To Obtain Primary And Secondary Samples:
	RO	Operate the primary AND secondary sample panels.
	RO	Open CCW to sample HX valves: • 1CC-114 • 1CC-115
	RO	Open CCW to GFFD valves: • 1CC-304 • 1CC-305
	RO	Align AND obtain activity, hydrogen AND boron samples of the following: • RCS hot legs • PRZ liquid space • All SGs
	SRO	Initiate Evaluation Of Plant Status: Check auxiliary building radiation – NORMAL Consult plant operations staff to evaluate plant equipment needed for recovery. Start additional plant equipment needed to assist in recovery as determined by the plant operations staff.
Procedure Note:		**When SG level decreases to 25%, AFW actuation occurs and the AFW flow control valves receive a full open signal.**

Op Test No.: NRC	Scenario # 3	Event # 9	Page 55 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	BOP	Check Intact SG Levels: Any Level - GREATER THAN 25% [40%] (YES) AFW flow - AT LEAST 210 KPPH AVAILABLE (YES) Control feed flow to maintain intact SG levels between 30% and 50% [40% and 50%]
Procedure Note:		**After the low steam pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.**
	RO	Check PRZ Pressure: • Pressure - LESS THAN 2000 PSIG (YES) • Block low steam pressure SI. (Locates MCB block switches and blocks SI)
Procedure Caution:		**If all RCPs are stopped, steps to depressurize the RCS and terminate SI should be performed as quickly as possible after the cooldown has started to minimize potential pressurized thermal shock of the reactor vessel.**
Procedure Note:		**Even if the lowest RCS cold leg temperature has dropped by 100°F in the last 60 minutes, steam may be released from intact SGs with pressure higher than the saturation pressure for lowest cold leg temperature.**
	BOP	Initiate RCS Cooldown To Cold Shutdown: • Maintain RCS cooldown rate less than 100°F/HR **(NOTE: Cooldown rate has been > 100°F/HR in last hour therefore a Cooldown will not be required.)**
	RO	Check RHR system - OPERATING IN SHUTDOWN COOLING MODE (NO)
	BOP	Check if steam dump to condenser – AVAILABLE (NO)

Op Test No.: NRC	Scenario # 3	Event # 9	Page 56 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	BOP	Check SG Status For Cooldown: • Check SGs - AT LEAST ONE INTACT SG AVAILABLE (YES)
	BOP	Dump steam from intact SGs using any of the following (listed in order of preference): • Condenser steam dump (Not Available) • SG PORVs • Checks Cooldown rate in all RCS cold legs and adjusts SG PORV positions to achieve maximum rate while not exceeding 100°F/HR
Evaluators Note:		**S/Gs can be depressurized even if the Cooldown rate has exceeded 100F/HR as long as the S/G pressure does not not cause a cooldown of the RCS.**
	SRO	Monitor Shutdown Margin While Continuing RCS Cooldown: Determine boron required for shutdown margin for anticipated RCS temperatures. (Refer to OST-1036, "SHUTDOWN MARGIN CALCULATION".) Check RCS boron – GREATER THAN BORON REQUIRED FOR SHUTDOWN MARGIN Check RCS boron - > Boron required for SDM
	SRO	Monitor Subcooled Recovery Criteria: Check RWST level – GREATER THAN 70% (YES)
	SRO	Check ruptured SG level – LESS THAN 95% [80%] (YES)
	SRO	Check RCS Subcooling – GREATER THAN 10°F [40°F] - C 20°F [50°F] – M (YES)
	SRO	Check SI Status: SI flow - GREATER THAN 200 GPM (YES)
Procedure Note:		• **Voiding may occur in the vessel upper head during RCS depressurization if RCPs are NOT in service. This will result in a rapidly increasing PRZ level.** • **RCS depressurization should NOT be stopped if RCS subcooling is lost. Subcooling should be restored as the cooldown continues.**

Op Test No.: NRC	Scenario # 3	Event # 9	Page 57 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	SRO	Depressurize RCS To Refill PRZ: PRZ level - LESS THAN 25% [40%] (YES – depressurize / NO do not depressurize -- time dependant)
With PRZ Level < 25%	RO	Depressurize using one PRZ PORV. • Locates MCB PRZ PORV switch and OPENS one PORV until PRZ level is >25% • Reports PRZ level to CRS and closes the open PORV to stop the RCS depressurization
Procedure Caution:		• **Following a complete loss of normal seal cooling, the affected RCP(s) should NOT be started prior to a status evaluation.** • **To prevent inadvertent criticality following natural circulation cooldown AND initiation of backfill, the RCP in the ruptured loop should NOT be the first RCP restarted.**
Procedure Note:		**RCPs should be run in order of priority (B only, A AND C, A only, C only) to provide normal PRZ spray. (IF the preferred RCP is in the loop with the ruptured SG, THEN a different RCP should be started prior to starting the preferred one.)**

Evaluators Note:		**The SRO should direct the RO to prepare to start "B" RCP but should not wait until the pump is started to continue with ECA-3.1. The SRO should circle these steps and move on in the procedure. The Pressurizer is continuing to fill due to the SI flow from the 2 running CSIP's.**
	SRO	Check If An RCP Should Be Started: Check ALL RCPs – Stopped (NO) **IF** RCP B running, **THEN** stop RCPs A **AND** C. Observe **NOTE** prior to Step 23 **AND** GO TO Step 23.
Procedure Note:		**After stopping one CSIP, RCS pressure should be allowed to stabilize OR increase before checking SI termination criteria.**

Op Test No.: NRC	Scenario # 3	Event # 9	Page 58 of 77
Event Description:	**Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut**		

Time	Position	Applicant's Actions or Behavior
	SRO	Check SI Reduction Criteria: Check both CSIPs – RUNNING (YES)
	SRO	Check RCS subcooling based on RCP status: Any RCP running (YES): Any RCP running: RCS subcooling - GREATER THAN 49F [94F] - C 64F [109F] - M
	SRO	PRZ level - GREATER THAN 25% [40%] (YES)
	RO	Stop one CSIP Locates MCB switch for a CSIP and places switch to STOP
	SRO	Check SI Termination Criteria: SI flow - GREATER THAN 200 GPM (YES)
	SRO	Check RCS subcooling based on RCP status: Any RCP running: (YES) RCS subcooling - GREATER THAN 49F [94F] - C 64F [109F] - M
	SRO	PRZ level - GREATER THAN 25% [40%] (YES)
	SRO	Isolate High Head SI Flow: Check CSIP suction – ALIGNED TO RWST (YES)
	RO	Open normal miniflow isolation valves 1CS-182 1CS-196 1CS-210 1CS-214
	RO	Shut BIT outlet valves: 1SI-3 1SI-4

Op Test No.: NRC	Scenario # 3	Event # 9	Page 59 of 77
Event Description:	Main Steam Line Isolation Signal Fails, 'C' MSIV fails to shut		
Time	Position	Applicant's Actions or Behavior	

Lead Evaluator:	**Terminate the scenario once the crew has isolated high head SI flow and the Pressurizer has gone solid and the PORVs are lifting .** **Direct the Simulator Operator to place the Simulator to FREEZE** **Announce "CREW UPDATE" – The NRC has the shift. Inform the crew to remain seated at their desk and to not discuss the scenario.**

Simulator Operator:	**When directed by the Lead Examiner go to FREEZE.**

Attachment 12 - Loss of Off-site Power Sequencer Operation Verification
Sheet 1 of 5

TRAIN - A Components		REQ POS	POS CK	TRAIN - B Components		REQ POS	POS CK
MLB 1A-SA				MLB 1B-SB			
1-2	CHRG SI PUMP A RUNNING	(1)		1-2	CHRG SI PUMP B RUNNING	(2)	
1-3	CHRG SI PUMP C-A RUNNING	(1)		1-3	CHRG SI PUMP C-B RUNNING	(2)	
1-4	CCW PUMP A RUNNING	(1)		1-4	CCW PUMP B RUNNING	(2)	
2-4	CCW PUMP C-A RUNNING	(1)		2-4	CCW PUMP C-B RUNNING	(2)	
7-1	EMER SW PUMP A RUNNING	LIT		7-1	EMER SW PUMP B RUNNING	LIT	
7-2	SW BSTR PUMP A RUNNING	LIT		7-2	SW BSTR PUMP B RUNNING	LIT	
9-1	SG A SMPL ISOL SHUT 1SP-217	LIT		9-1	SG A SMPL ISOL SHUT 1SP-214/216	LIT	
9-2	SG B SMPL ISOL SHUT 1SP-222	LIT		9-2	SG B SMPL ISOL SHUT 1SP-219/221	LIT	
9-3	SG C SMPL ISOL SHUT 1SP-227	LIT		9-3	SG C SMPL ISOL SHUT 1SP-224/226	LIT	
10-1	SG A BLDN ISOL SHUT 1BD-11	LIT		10-1	SG A BLDN ISOL SHUT 1BD-1	LIT	
10-2	SG B BLDN ISOL SHUT 1BD-30	LIT		10-2	SG B BLDN ISOL SHUT 1BD-20	LIT	
10-3	SG C BLDN ISOL SHUT 1BD-49	LIT		10-3	SG C BLDN ISOL SHUT 1BD-39	LIT	
MAIN CONTROL BOARD - BOP							
AUX FW MOTOR PUMP A-SA		START		AUX FW MOTOR PUMP B-SB		START	
ACTUATED BY EITHER TRAIN A OR B		SG-A 1AF-49 (FCV-2051A)				OPEN	
		SG-B 1AF-51 (FCV-2051B)				OPEN	
		SG-C 1AF-50 (FCV-2051C)				OPEN	

(1) Either A or C must be LIT; mark the other N/A
(2) Either B or C must be LIT; mark the other N/A

Attachment 12 - Loss of Off-site Power Sequencer Operation Verification
Sheet 2 of 5

TRAIN - A Components	REQ POS	POS CK	TRAIN - B Components	REQ POS	POS CK
MAIN CONTROL BOARD - BOP					
1MS-70 SA MAIN STEAM B AUX FW TURBINE	OPEN		1MS-72 SB MAIN STEAM C TO AUX FW TURBINE	OPEN	
ACTUATED BY EITHER TRAIN A OR B	1X SAB T&T AUX FW TURBINE TRIP & THROTTLE VLV			OPEN	
A1 A-SA EMERGENCY BUS 1A-SA TO XFMER A1 BREAKER (OSI PI) (MCR) EMERGENCY BUS A-SA TO XFMER A1 BREAKER A1 A-SA	TRIP		B1 B-SB EMERGENCY BUS 1B-SB TO XFMR B1 BREAKER (OSI PI) (MCR) EMERGENCY BUS B-SB TO XFMER B1-SB BREAKER B1 A-SB	TRIP	
DIESEL GEN A SA BREAKER 106 SA	CLOSE		DIESEL GEN B SB BREAKER 126 SB	CLOSE	
EMERGENCY BUS A SA TO AUX BUS D TIE BREAKER 105 SA	TRIP		EMERGENCY BUS B SB TO AUX BUS E TIE BREAKER 125 SB	TRIP	
A-SA DIESEL GENERATOR	START		B-SB DIESEL GENERATOR	START	
E-86 A-SA DIESEL GENERATOR ROOM EXHAUST FAN	START		E-86 C-SB DIESEL GENERATOR ROOM EXHAUST FAN	START	
AH-85 A-SA ELEC EQUIP ROOM SUPPLY FAN	START		AH-85 C-SB ELEC EQUIP ROOM SUPPLY FAN	START	
E-61 A-SA DAY TANK & SILENCER ROOM EXHAUST FAN	START		E-61 C-SB DAY TANK & SILENCER ROOM EXHAUST FAN	START	
AH-2 A-SA FAN COOLER (1)	HI SP		AH-1 B-SB FAN COOLER (1)	HI SP	
AH-3 A-SA FAN COOLER (1)	HI SP		AH-4 B-SB FAN COOLER (1)	HI SP	
S-4 A-SA REACTOR SUPPORT COOLING FAN	START		S-4 B-SB REACTOR SUPPORT COOLING FAN	START	
S-2 A-SA PRIMARY SHIELD COOLING FAN	START		S-2 B-SB PRIMARY SHIELD COOLING FAN	START	
R-2 A-SA EMERGENCY FILTRATION FAN	START		R-2 B-SB EMERGENCY FILTRATION FAN	START	
AH-15 A-SA NORMAL SUPPLY FAN	START		AH-15 B-SB NORMAL SUPPLY FAN	START	

(1) LEAD FAN SELECTOR switch will determine which fan in each cooler will start.

Attachment 12 - Loss of Off-site Power Sequencer Operation Verification
Sheet 3 of 5

TRAIN - A Components	REQ POS	POS CK	TRAIN - B Components	REQ POS	POS CK
			AEP-1		
WC-2 A-SA WATER CHILLER COMPRESSOR	START		WC-2 B-SB WATER CHILLER COMPRESSOR	START	
P-4 A-SA CHILLED WATER PUMP	START		P-4 B-SB CHILLED WATER PUMP	START	
AH-7 A-SA CCW PUMP AREA FAN COOLER	START		AH-7 B-SB CCW PUMP AREA FAN COOLER	START	
AH-10 A-SA CSIP SAB AREA FAN COOLER	START		AH-10 B-SB CSIP SAB AREA FAN COOLER	START	
AH-6 A-SA CCW PUMP AREA FAN COOLER	START		AH-6 B-SB CCW PUMP AREA FAN COOLER	START	
AH-9 A-SA CSIP SA AREA FAN COOLER	START		AH-9 B-SB CSIP SB AREA FAN COOLER	START	
AH-28 A-SA 216' RAB MECH PENET AREA FAN COOLER	START		AH-28 B-SB BIT AREA FAN COOLER	START	
AH-24 X-SA SA AREA FAN COOLER	START		AH-25 X-SB SB AREA FAN COOLER	START	
AH-5 A-SA CSP & RHR PUMPS FAN COOLER	START		AH-5 B-SB CSP & RHR PUMP FAN COOLER	START	
AH-11 A-SA 236' RAB MECH PENET AREA FAN COOLER	START		AH-11 B-SB 236' RAB MECH PENET AREA FAN COOLER	START	
AH-92 A-SA MCC A35 FAN COOLER	START		AH-92 B-SB MCC B35 FAN COOLER	START	
AH-20 A-SA AFWP & HVAC CHILLER FAN COOLER	START		AH-20 B-SB AFWP & HVAC CHILLER FAN COOLER	START	
AH-19 A-SA AFWP & HVAC CHILLER FAN COOLER	START		AH-19 B-SB AFWP & HVAC CHILLER FAN COOLER	START	
AH-23 X-SA RHT AREA FAN COOLER	START		AH-8 X-SB SW BSTR PUMP AREA FAN COOLER	START	

Attachment 12 - Loss of Off-site Power Sequencer Operation Verification
Sheet 4 of 5

TRAIN - A Components		REQ POS	POS CK	TRAIN - B Components		REQ POS	POS CK
AEP-1							
AH-93 X-SA ROD CONTROL CABINET FAN COOLER		START		AH-29 X-SB WPS & INST RACK FAN COOLER		START	
S-64 X-SA SUPPLY FAN		START		S-65 X-SB SUPPLY FAN		START	
AH-26 A-SA EQUIPMENT ROOM 2 FAN COOLER		START		AH-26 B-SB EQUIPMENT ROOM 1 FAN COOLER		START	
AH-12 A-SA RAB SWGR ROOM SUPPLY FAN		START		AH-13 A-SB RAB SWGR ROOM SUPPLY FAN		START	
AH-16 A-SA SUPPLY FAN		START		AH-16 B-SB SUPPLY FAN		START	
E-86 A-SA EXHAUST FAN		START		E-86 A-SB EXHAUST FAN		START	
ESS LB 1A-SA				ESS LB 1B-SB			
8-1	EMERG INTK TRAV SCRN (Main Reservoir Screen)	START (3)		8-1	EMERG INTK TRAV SCRN (Main Reservoir Screen)	START (3)	
8-2	EMERG INTK TRAV SCRN WASH PUMP	START		8-2	EMERG INTK TRAV SCRN WASH PUMP	START	

(3) Screen operation is dependent on ESW suction alignment; mark the unused screen N/A.

Attachment 12 - Loss of Off-site Power Sequencer Operation Verification
Sheet 5 of 5

TRAIN - A Components	REQ POS	POS CK	TRAIN - B Components	REQ POS	POS CK
COMPUTER OR LOCAL INDICATION					
A ESW AUX RSVR TRAVELING SCREEN COMPUTER POINT ID ZSC2298A	START (3)		B ESW AUX RSVR TRAVELING SCREEN COMPUTER POINT ID ZSC2304A	START (3)	
A ESW PUMP DISCH STRAINER 1A32-SA-1E	START (4)		B ESW PUMP DISCH STRAINER 1B32-SB-1E	START (4)	

WATER HAMMER CHECKS	COMPLETED
If evidence of water hammer has been found or a water hammer was heard during the plant trip, then perform walkdowns and inspections per PLP-631, Attachment 1. (NUREG CR-5220) (Reference CR 96-03367-6, ESR 97-00008, EC 60449)	

(3) Screen operation is dependent on ESW suction alignment; mark the unused screen N/A.

(4) The strainer is slave to pump start. Function is acceptable if ALB-2 1-1 is not lit.

Comment No. Description

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Signature: _____ Time _____ Date _____

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 1 of 8
Safeguards Actuation Verification

NOTE

- General guidance for verification of safeguards equipment is contained in Attachment 4 of this procedure.
- ERFIS displays of safeguards equipment status are not reliable while any associated safety-related electrical buses are de-energized.

☐ 1. Verify Two CSIPs - RUNNING

☐ 2. Verify Two RHR Pumps - RUNNING

☐ 3. Verify Two CCW Pumps - RUNNING

☐ 4. Verify All ESW **AND** ESW Booster Pumps - RUNNING

☐ 5. Verify SI Valves - PROPERLY ALIGNED

(Refer to Attachment 1.)

☐ 6. Verify CNMT Phase A Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 4.)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 2 of 8
Safeguards Actuation Verification

☐ 7. Verify SG Blowdown **AND** SG Sample Isolation Valves In Table 1 - SHUT

Table 1: SG Blowdown And Sample Isolation Valves

Process Line	Outside CNMT (MLB-1A-SA)	Inside CNMT (MLB-1B-SB)
SG A Sample	1SP-217	1SP-214/216
SG B Sample	1SP-222	1SP-219/221
SG C Sample	1SP-227	1SP-224/226
SG A Blowdown	1BD-11	1BD-1
SG B Blowdown	1BD-30	1BD-20
SG C Blowdown	1BD-49	1BD-39

8. **IF** Main Steam Line Isolation Actuated **OR** Is Required By Any Of The Following, **THEN** Verify MSIVs **AND** MSIV Bypass Valves - SHUT

☐ • Steam line pressure - LESS THAN 601 PSIG

☐ • CNMT pressure - GREATER THAN 3.0 PSIG

9. **IF** CNMT Spray Actuation Signal Actuated **OR** Is Required, **THEN** Verify The Following:

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 9.)

☐ • CNMT spray pumps - RUNNING

☐ • CNMT spray valves - PROPERLY ALIGNED

☐ • Phase B isolation valves - SHUT

☐ • All RCPs - STOPPED

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 3 of 8
Safeguards Actuation Verification

☐ 10. Verify Both Main FW Pumps - TRIPPED

☐ 11. Verify FW Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 6.)

☐ 12. Verify both MDAFW pumps - RUNNING

13. IF any of the following conditions exist, THEN verify the TDAFW pump - RUNNING

☐ • Undervoltage on either 6.9 KV emergency bus

☐ • Level in two SGs - LESS THAN 25%

☐ • Manual actuation to control SG level

14. Verify AFW Valves - PROPERLY ALIGNED

☐ • IF no AFW Isolation Signal, THEN verify isolation and flow control valves - OPEN

NOTE

An AFW Isolation signal signal requires a Main Steam Line Isolation coincident with one SG pressure 100 PSIG below the other two SGs.

☐ • IF AFW Isolation Signal present, THEN verify MDAFW and TDAFW isolation and flow control valves to affected SG - SHUT

☐ 15. Verify Both EDGs - RUNNING

☐ 16. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 4 of 8
Safeguards Actuation Verification

☐ 17. Verify CNMT Ventilation Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 7.)

☐ 18. Verify Control Room Area Ventilation - MAIN CONTROL ROOM ALIGNED FOR EMERGENCY OPERATION

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 5, Sheets 1 and 2, Sections for MAIN CONTROL BOARD, SLB-5 and SLB-6.)

19. Verify Essential Service Chilled Water System Operation:

☐ • Verify both WC-2 chillers - RUNNING

☐ • Verify both P-4 pumps - RUNNING

☐ (Refer to AOP-026, "LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM" for loss of any WC-2 chiller.)

20. Verify CSIP Fan Coolers - RUNNING

☐ AH-9 A SA
☐ AH-9 B SB
☐ AH-10 A SA
☐ AH-10 B SB

NOTE

Security systems are powered by bus 1A1 (normal supply) or bus 1B1 (alternate supply). Backup power will be available for approximately 30 MINUTES after the supplying bus is de-energized. (Refer to OP-115, "CENTRAL ALARM STATION ELECTRICAL SYSTEMS", Section 8.9 and 8.10.)

☐ 21. Verify AC buses 1A1 **AND** 1B1 - ENERGIZED

☐ 22. Place Air Compressor 1A **AND** 1B In The LOCAL CONTROL Mode.

(Refer to Attachment 7.)

Op Test No.:	NRC	Scenario #	3	Event #	N/A	Page	69	of	77
E-0, Reactor Trip or Safety Injection Attachment 3									

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 5 of 8
Safeguards Actuation Verification

CAUTION

The maximum calculated dose rate in the vicinity of MCC 1A35-SA and MCC 1B35-SB is between 10 MREM/HR and 150 MREM/HR.

☐ 23. Dispatch An Operator To Unlock **AND** Turn ON The Breakers For The CSIP Suction **AND** Discharge Cross-Connect Valves:

(Refer to Attachment 2.)

MCC 1A35-SA		MCC 1B35-SB	
VALVE	CUBICLE	VALVE	CUBICLE
1CS-170	4A	1CS-171	4D
1CS-169	4B	1CS-168	7D
1CS-218	14D	1CS-220	9D
1CS-219	14E	1CS-217	12C

24. Check If C CSIP Should Be Placed In Service:

☐ • **IF** two charging pumps can **NOT** be verified to be running, **AND** C CSIP is available, **THEN** place C CSIP in service in place of the non-running CSIP using OP-107, "CHEMICAL **AND** VOLUME CONTROL SYSTEM, Section 8.5 or 8.7.

Op Test No.:	NRC	Scenario #	3	Event #	N/A	Page	71	of	77
E-0, Reactor Trip or Safety Injection Attachment 3									

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 6 of 8
Safeguards Actuation Verification

25. Start The Spent Fuel Pump Room Ventilation System:

a. At AEP-1, verify the following ESCWS isolation valves - OPEN

1) SLB-11 (Train A)

☐ • AH-17 SUP CH 100 (Window 9-1)

☐ • AH-17 RTN CH 105 (Window 10-1)

2) SLB-9 (Train B)

☐ • AH-17 SUP CH 171 (Window 9-1)

☐ • AH-17 RTN CH 182 (Window 10-1)

b. At AEP-1, start one SFP PUMP ROOM FAN COOLER:

☐ • AH-17 1-4A SA

☐ • AH-17 1-4B SB

Op Test No.:	NRC	Scenario #	3	Event #	N/A	Page	73	of	77
E-0, Reactor Trip or Safety Injection Attachment 3									

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 7 of 8
Safeguards Actuation Verification

NOTE

- Fuel pool levels **AND** temperatures should be monitored approximately every 1 to 2 HOURS.
- Following the initial check of fuel pool levels and temperature, monitoring responsibilities may be assumed by the plant operations staff (including the TSC or STA).
- Only fuel pools containing fuel are required to be monitored.

26. Check Status Of Fuel Pools:

☐ a. Operate spent fuel cooling pumps to maintain fuel pool temperatures between 85° F and 105° F.

b. Monitor fuel pool levels **AND** temperatures:

☐ • Refer to AOP-041, "SPENT FUEL POOL EVENT" Attachments 7, 8, 9, 10 and 11 for SFP parameter monitoring methods.

☐ • Refer to Curves H-X-24, H-X-25 and H-X-26 for SFP time to 200° F.

☐ • Levels - GREATER THAN LO ALARM (284 FT, 0 IN)

☐ • Temperatures - LESS THAN HI TEMP ALARM (105° F)

Op Test No.:	NRC	Scenario #	3	Event #	N/A	Page	75	of	77
E-0, Reactor Trip or Safety Injection Attachment 3									

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 8 of 8
Safeguards Actuation Verification

NOTE

IF control room ventilation was previously aligned to an emergency outside air intake for post-accident operations, **THEN** follow-up actions will be required to restore the alignment.

27. Consult Plant Operations Staff Regarding Alignment Of The Control Room Ventilation System:

☐ • Site Emergency Co-ordinator - Control Room

☐ • Site Emergency Co-ordinator - Technical Support Center

(Refer to PEP-230, "CONTROL ROOM OPERATIONS".)

- END -

Rev. 1

Revised per NRC comments provided on 75 day outline submittal.

Archie Lucky 6/17/2013

Rev. 2

Revised per Operations validation comments.

Archie Lucky 7/01/2013

HARRIS 2013 NRC SCENARIO 4

Facility:	SHEARON-HARRIS	Scenario No.:	4	Op Test No.:	05000400/2013301
Examiners:		Operators:	SRO:		
			RO:		
			BOP:		

Initial Conditions:
- IC-19, MOL, 100% power
- 'B' MD AFW Pump is under clearance for pump packing replacement
- 1SI-3, Boron Injection Tank Outlet valve is under clearance for breaker repairs
- 'B' Condenser Vacuum Pump is under clearance for makeup water supply valve problems
- Boric Acid Transfer Pump B-SB is under clearance for motor replacement

Turnover:
- A plant shutdown is required due to problems encountered during the repairs on the 'B' MDAFW Pump. Repairs will not be able to be completed prior to the LCO expiring. The plant is operating at ~100% power in MOL. When turnover is complete a power reduction at 4 DEH units/min must be started to support being in Mode 3 within the next 6 hours. All required notifications have been made to individuals concerning the reason for the shutdown.

Critical Task:
- Open 1MS-70 or 1MS-72 to establish a minimum of 210 KPPH AFW flow to the Steam Generators prior to exiting ECA-0.0
- Emergency Stop the 'A' and 'B' Charging Safety Injection Pump prior to the 'B' CSIP failure due to overheating
- Emergency Stop the 'A' and 'B' Emergency Diesel Generator prior to the 'B'EDG failure due to overheating
- Energize "A" AC emergency bus when offsite power becomes available prior to aligning equipment for extended power loss (step 11 of ECA-0.0)

Event No.	Malf. No.	Event Type*	Event Description
1	lt:459 cvc17	I – RO/SRO TS – SRO	Controlling Pressurizer Level Channel, LT-459, fails HIGH (APP-ALB-009), with only manual control of FK-122.1 available
2	N/A	R – RO/SRO N – BOP/SRO	Plant Shutdown (GP-006)
3	nis08b	I – RO/SRO TS – SRO	PR NIS Channel N-42 fails HIGH (AOP-001)
4	gen01	C – BOP/SRO	Generator Voltage Regulator Failure (APP-ALB-022)
5	hva04	C – BOP/SRO TS – SRO	"A" Emergency Services Chilled Water Pump Trip (AOP-026)
6	cfw16b	C – RO/SRO	Main Feedwater Pump 1B Breaker Trips
7	eps01a	M – ALL	Loss of Offsite Power, Reactor Trip
8	dsg42 zdsq2:6a jpb9101a xa1i146	C – BOP/SRO C – RO/SRO	Loss of ALL AC power

rev'd 7/8/13

SCENARIO 4 continued

9	z1974tdi z1975tdi	C – BOP/SRO	1MS-70 and 1MS-72 fail to auto open (Loss of all AFW until operator opens 1MS-70 or 72)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4

A plant shutdown is required due to problems encountered during the repairs on the 'B' MDAFW Pump. Repairs will not be able to be completed prior to the LCO expiring. The plant is operating at ~100% power in MOL. When turnover is complete a power reduction at 4 DEH units/min must be started to support being in Mode 3 within the next 6 hours. All required notifications have been made to individuals concerning the reason for the shutdown.

The following equipment is under clearance:

- 'B' MDAFW Pump is under clearance for pump packing repairs. The pump has been inoperable for 12 hours and will be restored to operable status within the next 24 hours. Tech Spec 3.7.1.2 LCO Action **a** and Tech Spec 3.3.3.5.b Action **c** applies. 72 hour LCO or HSB within the next 60 hours, HSD following 6 hours.

PLANT SYSTEMS

AUXILIARY FEEDWATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.2 At least three independent steam generator auxiliary feedwater pumps and associated flow paths shall be OPERABLE with:

a. Two motor-driven auxiliary feedwater pumps, each capable of being powered from separate emergency buses, and

b. One steam turbine-driven auxiliary feedwater pump capable of being powered from an OPERABLE steam supply system.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one auxiliary feedwater pump inoperable, restore the required auxiliary feedwater pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

INSTRUMENTATION

REMOTE SHUTDOWN SYSTEM

LIMITING CONDITION FOR OPERATION

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4 continued

3.3.3.5.b All transfer switches, Auxiliary Control Panel Controls and Auxiliary Transfer Panel Controls for the OPERABILITY of those components required by the SHNPP Safe Shutdown Analysis to (1) remove decay heat via auxiliary feedwater flow and steam generator power-operated relief valve flow from steam generators A and B, (2) control RCS inventory through the normal charging flow path, (3) control RCS pressure, (4) control reactivity, and (5) remove decay heat via the RHR system shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

c. With one or more inoperable Remote Shutdown System transfer switches, power, or control circuits required by 3.3.3.5.b, restore the inoperable switch(s)/circuit(s) to OPERABLE status within 7 days, or be in HOT STANDBY within the next 12 hours.

- 'B' Condenser Vacuum Pump is under clearance for makeup water supply valve problems. Has been under clearance for 8 hours. Repairs are expected to be completed within 24 hours.

- 1SI-3, Boron Injection Tank Outlet valve is under clearance for breaker repairs. The valve is shut with power removed. The valve has been under clearance for 4 hours. OWP-SI-01 has been completed. Repairs are expected to be completed within 24 hours. Tech Specs 3.5.2 and 3.6.3 apply.

EMERGENCY CORE COOLING SYSTEMS

3/4.5.2 ECCS SUBSYSTEMS - T_{avg} GREATER THAN OR EQUAL TO 350°F

LIMITING CONDITION FOR OPERATION

3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE Charging/safety injection pump,

b. One OPERABLE RHR heat exchanger,

c. One OPERABLE RHR pump, and

d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and, upon being manually aligned, transferring suction to the containment sump during the recirculation phase of operation.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4 continued

1SI-3, Boron Injection Tank Outlet valve, Tech Specs...continued

3/4.6.3 CONTAINMENT ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.3 Each containment isolation valve specified in the Technical Specification Equipment List Program, plant procedure PLP-106, shall be OPERABLE with isolation times less than or equal to required isolation times.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more of the containment isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and:

a. Restore the inoperable valve(s) to OPERABLE status within 4 hours, or

b. Isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position, or

- Boric Acid Transfer Pump B-SB is under clearance for motor replacement. Has been under clearance for 12 hours. Repairs are expected to be completed within 24 hours. Tech Spec 3.3.3.3.5.b which is a 7 day LCO and 3.1.2.2 applies (3.1.2.2 is for tracking only). OWP-CS-05 has been completed.

REMOTE SHUTDOWN SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.3.5.a The Remote Shutdown System monitoring instrumentation channels shown in Table 3.3-9 shall be OPERABLE.

3.3.3.5.b All transfer switches, Auxiliary Control Panel Controls and Auxiliary Transfer Panel Controls for the OPERABILITY of those components required by the SHNPP Safe Shutdown Analysis to (1) remove decay heat via auxiliary feedwater flow and steam generator power-operated relief valve flow from steam generators A and B, (2) control RCS inventory through the normal charging flow path, (3) control RCS pressure, (4) control reactivity, and (5) remove decay heat via the RHR system shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With the number of OPERABLE remote shutdown monitoring channels less than the Minimum Channels OPERABLE as required by Table 3.3-9, restore the inoperable channel(s) to OPERABLE status within 7 days, or be in HOT SHUTDOWN within the next 12 hours.

b. With the number of OPERABLE remote shutdown monitoring channels less than the Total Number of Channels required by Table 3.3-9, restore the inoperable channels to OPERABLE status within 60 days or submit a Special Report in accordance with Specification 6.9.2 within 14 additional days.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4 continued

Event 1: Controlling Pressurizer Level Channel LT-459 fails HIGH and FK-122.1 auto failure. The crew should respond to the level transmitter failure in accordance with alarm response procedure APP-ALB-09-4-2 and window 2-1. The crew will take Charging FCV-122 to Manual and maintain pressurizer level within the control bands and trip limits of OMM-001 Attachment 13. The crew will shift level control to an alternate channel. When FK-122.1, Charging Flow control valve, is taken to manual the automatic control of the valve will fail. When the RO pushes the Automatic button on the control nothing will occur and the control will remain in manual. This will require the crew to remain in manual control to maintain PZR level for the remainder of the scenario. The SRO will evaluate Tech. Spec 3.3.1 for any impact due to the failed instrument and complete OMM-001 Attachment 5.

TS 3.3.1 As a minimum the Reactor Trip System instrumentation channels and interlocks of Table 3.3-1 shall be OPERABLE

Table 3.3-1

TABLE 3.3 1

REACTOR TRIP SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
11. Pressurizer Water Level--High (Above P-7)	3	2	2	1	6

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4 continued

Event 2: Plant Shutdown (GP-006). Crew performs a power reduction IAW GP-006. For this reactivity manipulation it is expected that the SRO will conduct a reactivity brief, the RO will borate per the reactivity plan and the BOP will operate the DEH Controls as necessary to lower power.

Event 3: PRNIS Channel N-42 fails HIGH (AOP-001). This malfunction will cause rods to start stepping in at maximum speed (72 steps per minute). The crew should respond by entering AOP-001, Malfunction of Rod Control and Indication System and perform the immediate actions which will be placing the Rod Control selector switch to MANUAL. The crew will then perform the follow up actions of AOP-001, implement OWP-RP-24 and OP-104 Section 5.5 in order to restore Rod Control to automatic. The evaluator should wait until the Simulator Operator runs OWP-RP-024-TST before inserting event 4. The SRO will evaluate Tech. Spec 3.3.1 for any impact due to the failed instrument.

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
1. Manual Reactor Trip	2	1	2	1, 2	1
	2	1	2	3', 4', 5'	9
2. Power Range, Neutron Flux					
a. High Setpoint	4	2	3	1, 2	2
b. Low Setpoint	4	2	3	1###, 2	2
3. Power Range, Neutron Flux High Positive Rate	4	2	3	1, 2	2
4. Power Range, Neutron Flux, High Negative Rate	4	2	3	1, 2	2

ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours,

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1, and

c. Either, THERMAL POWER is restricted to less than or equal to 75% of RATED THERMAL POWER and the Power Range Neutron Flux Trip Setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER within 4 hours; or, the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours per Specification 4.2.4.2.

Event 4: Generator Voltage Regulator Failure (APP-ALB-022). The voltage regulator failure will cause generator MVARS to rise above the normal control band. ALB-22-9-4, ALB-22-4-5 and ERFIS indications will alert the operators to this condition if not detected earlier by changes in generator MVARS. Annunciator guidance will have the BOP operator attempting to control voltage with the voltage regulator in MANUAL, but attempts for this type of control will fail requiring the base adjuster to be used to reduce MVARs to a value within normal operational limits (75 to 175 MVARs). This failure will also require the crew to notify the Load Dispatcher that the voltage regulator is in Manual control within 30 minutes. The SRO will complete OMM-001 Attachment 5.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4 continued

Event 5: "A" Emergency Services Chilled Water Pump Trip (AOP-026). The crew will respond to various alarms on ALB-023, diagnose the event, and enter AOP-026, Loss of Essential Chill Water System (no immediate actions). The SRO will direct the BOP to start the 'B' Train ESCWS Chiller IAW OP-148, Essential Service Chilled Water System. The crew should implement OWP-ECW-01 for the ESCW Chiller 1A-SA failure. The SRO should evaluate Tech Spec 3.7.13, Essential Services Chilled Water System and PLP-114, Relocated Technical Specifications and Design Basis Requirements – Attachment 4 for Area Temperature Monitoring. Note that the 'A' Chiller will be inoperable for the remainder of the scenario and this will impact plant response during the Major Event in that this failure will prevent Load Block 9 on sequencer Train 'A" from energizing. The SRO will complete OMM-001 Attachment 5 for the failure.

TS 3.7.13

PLANT SYSTEMS

3/4.7.13 ESSENTIAL SERVICES CHILLED WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.13 At least two independent Essential Services Chilled Water System loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one Essential Services Chilled Water System loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Event 6: Main Feedwater Pump 1B Recirculation Valve (1FW-39) fails OPEN - The crew should identify that the 1B FW pump recirc valve has failed open by MCB light changes from green to red, FW discharge pressure changes, SG Feedflow/Steam flow changes, SG level trends on the ERFIS computer screen displays and by level trends on the WR and NR level recorders. The BOP may attempt to close the valve when the incorrect position is observed but the valve will not close from the MCB. The crew may dispatch the Turbine Building AO immediately or when directed by AOP-010, Feedwater Malfunctions. When the crew enters AOP-010 they will initially perform the immediate action to verify that a FW pump has not tripped. The SRO work through procedure steps to have the recirc valve manually closed. The AO will not be successful with shutting the recirc valve and all SG levels will reach OMM-001 and AOP-010 trip limits of 30% within approximately 5 minutes. When the Reactor trip is activated event 7 will be automatically inserted. The SRO will complete OMM-001 Attachment 5.

Event 7 (Major): Loss of Offsite Power, Reactor Trip – Once the crew has activated the Reactor trip switch and the Reactor trip breakers open a loss of Offsite Power will occur. The crew will enter EOP-E-O, Reactor Trip or Safety Injection. While implementing the actions of E-0 for the loss of Offsite power/Reactor Trip Event 8 is occurring. The BOP maybe directed to implement AOP-025 during E-0 implementation.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4 continued

Event 8: Loss of ALL AC power: With the loss of offsite power both Emergency Busses will lose power which will auto start both EDGs on under voltage signals. The sequencers will run in program "A". 'B' EDG output breaker 126 will trip prior to the sequencer reaching Load Block 9 (< 60 seconds from breaker 126 closing). This will cause a complete loss of power to the 'B' Emergency Bus. Additionally, during 'A' EDG sequencer operation the 'A' ESW pump start signal will fail. The BOP should be monitoring sequencer operation and identify that in Load Block 2 the 'A' ESW pump failed to start or the SRO or RO could discover the failure based on MCB SW annunciators. A second 'A' ESW pump auto start signal generated on SW low pressure will also not occur due to an isolated Service Water transmitter.

Since the 'A' Emergency Services Chilled Water Pump tripped during event 5 the 'A' sequencer will not complete its cycle and load block 9 will not occur. The crew would have waited until AFTER load block 9 then attempted to manually start the 'A' ESW pump from the MCB switch. A successful start of the 'A' ESW pump may have occurred if not for the additional failures associated with this event.

Since load block 9 is NOT actuated a timer to manually actuate load block 9 will run. This timer runs for 150 seconds before the manual load block permissive can be initiated. IF the crew waits for the 150 second timer to time out and allows the 'A' CSIP and 'A' EDG to continue to run without ESW cooling both the CSIP and the EDG could potentially overheat and fail. If at any time the crew attempts to manually start the 'A' ESW pump from the MCB switch they will find that it will NOT start (switch is failed). The crew should identify that AOP-022, Loss of Service Water, entry is required. The immediate actions of AOP-022 require that the 'A' CSIP and 'A' EDG be secured if ESW is lost for more than 1 minute. Securing the 'A' EDG will stop both the EDG and CSIP. To secure the EDG the crew will have to use the Emergency Stop controls since an emergency start on bus under voltage started the EDG. Prior to securing the EDG the crew should discuss that when the 'A' EDG is stopped both Emergency Busses will be without power and a Loss of ALL AC power event will occur which will require entry into ECA-0.0. The BOP should locate the 'A' EDG Emergency Stop switch and take the switch to the stop position then verify that the EDG has stopped and at this time the SRO should transition from E-0 to ECA-0.0. The RO and BOP should perform the immediate actions of ECA-0.0 and the crew should then implement ECA-0.0 until power is available. Prior to evaluating extended power loss conditions in ECA-0.0 (step 9) the load dispatcher will inform the crew that the source of the offsite fault has been identified and corrected and give permission to restore power to the station from offsite. The crew will use Attachment 1 and restore power to the 'A' bus.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 4 continued

Event 9: 1MS-70 and 1MS-72 fail to auto open (Loss of all AFW until operator opens 1MS-70 or 72). 'B' MD AFW Pump is under clearance and 'A' MD AFW Pump will lose power. The Turbine Driven AFW pump should start on either a loss of power to the Emergency Bus or low level in 2 of 3 SGs. Both conditions will be blocked preventing the auto opening of both 1MS-70 and 1MS-72. If the crew does not respond by opening either 1MS70 or 1MS-72 then a loss of all FW to the Steam Generators will create a RED path on Heat Sink (FR-H.1). Since a loss of ALL AC Power will occur the crew will be implementing ECA-0.0. A caution prior to step 1 of ECA-0.0 states: Critical Safety Function Status Trees should be monitored for information only. Function Restoration Procedures should NOT be implemented unless directed by this procedure. The crew should remain in ECA-0.0 and NOT transition to FR-H.1 if there is a time when a RED path exists. The crew should identify that there is no Feedwater flow to the SG's and open either 1MS-70 or 1MS-72 to establish a motive force to run the Turbine Driven AFW pump. Additionally, after opening either 1MS-70 or 1MS-72 to establish flow to the SG the TDAFW pump speed controller should be manually increased to obtain a minimum of 210 KPPH AFW flow.

Scenario termination will occur after the crew restores power from offsite sources to the 'A' Emergency bus IAW ECA-0.0 Attachment 1 then transitions from ECA-0.0 to E-0, Reactor Trip or Safety Injection. After completing steps 1-4 of E-0 the crew will transition to ES-0.1, Reactor Trip Response. When the crew demonstrates that they can implement step 4 to stabilize and maintain RCS temperature between 555°F and 559°F the scenario will end.

CRITICAL TASK JUSTIFICATION:

1. Open 1MS-70 or 1MS-72 to establish a minimum of 210 KPPH AFW flow to the Steam Generators prior to exiting ECA-0.0

   Failure to establish the minimum required AFW flow results in adverse consequences or significant degradation in the mitigative capability of the plant. This critical task requires the crew to recognize an automatic actuation of an ESF system or component should have occurred but has not and then take manual operator actions to restore the required flow.

2. Emergency Stop the 'A' and 'B' Emergency Diesel Generator prior to the 'A' EDG failure due to overheating

   The running CSIP or running EDG are considered essential loads of the ESW system IAW AOP-022 both components are required to be stopped if ESW flow is lost for greater than one minute. This is done to protect against equipment damage. Failure to stop these ESF components increases the probability that they will not be available to support long term efforts to cool the core and place the plant in a safe condition.

3. Stop the 'A' and 'B' Charging Safety Injection Pump prior to the 'A' CSIP failure due to overheating (NOTE: if the EDG is Emergency stopped then the 'A' CSIP will not have power and it will be stopped also)

   The running CSIP or running EDG are considered essential loads of the ESW system IAW AOP-022 both components are required to be stopped if ESW flow is lost for greater than one minute. This is done to protect against equipment damage. Failure to stop these ESF components increases the probability that they will not be available to support long term efforts to cool the core and place the plant in a safe condition.

4. Energize 'A' AC emergency bus when offsite power becomes available prior to aligning equipment for extended power loss (step 11 of ECA-0.0).

   Failure to energize an AC emergency bus constitutes mis-operation or incorrect crew performance which leads to degraded emergency power capacity. Failure to perform this task also results in the needless degradation of a barrier to fission product release via the RCP seals. Energize at least one AC emergency bus before transition out of E-0, unless the transition is to ECA-0.0, in which case the critical task must be performed before placing safeguards equipment hand switches in the pull-to-lock position. For Harris station safeguards equipment cannot be placed in pull-to-lock so the task would be to energize the emergency bus prior to aligning equipment for extended power loss and locally de-energizing control power to the ESF pumps.

SIMULATOR SETUP

For the 2013 NRC Exam Simulator Scenario #4

Reset to IC-164 password "dinner"

Go to RUN

Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner.

Set ERFIS screens

(The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

SPECIAL INSTRUCTIONS

Provide a Reactivity Plan to candidates for shutting down the plant
Provide a copy of the following procedures:

- GP-006, NORMAL PLANT SHUTDOWN FROM POWER OPERATION TO HOT STANDBY (MODE 1 TO MODE 3) **marked up** through section 5.2 step 3 with step 3 signed off and step 4 circled

Press START on Counter Scaler
Post conditions for status board from IC-19
Reactor Power 100% steady state
Control Bank D at 218 steps
RCS boron 1034 ppm

"B" MDAFW Pump is OOS for pump packing problems
Pump has been OOS for 12 total hours and is expected back within the next 24 hours Tech Spec 3.7.1.2, 72 hour LCO or HSB within the next 6 hours, HSD following 6 hours

1SI-3, Boron Injection Tank Outlet valve has been under clearance for 4 hours. Tech Spec 3.5.2 applies – 72 hour LCO or HSB within the next 6 hours and HSD within the following 6 hours. Tech Spec 3.6.3 also applies but is met by removing power and having the valve shut.

Boric Acid Transfer Pump B-SB has been under clearance for 12 hours. Tech Spec 3.3.3.5.b – Action a applies, restore to operable within 7 days or HSD within the next 12 hours. Tech Spec 3.1.2.2 also applies (tracking only).

Align equipment for repairs:

Hang CIT on "B" MDAFW Pump MCB switch then place protected train placards per OMM-001 Attachment 16 on "A" MDAFW Pump, MS-70 and 72, "B" ESW Pump, "B" RHR Pump and "B" CCW Pump
Boron Injection Pump B-SB, place pump switch to STOP, and hang CIT on MCB switch

SIMULATOR SETUP (continued)

Condenser Vacuum Pump 1B, place pump switch to STOP, and hang CIT on MCB switch
1SI-3, Boron Injection Tank Outlet valve, and hang CIT on MCB switch

Place filled out copies of OWP's into the OWP book – ensure they are removed at end of day

- OWP-SI-01 and place in MCR OWP book for 1SI-3 clearance
- OWP-CS-05 and place in MCR OWP book for "B" BA Transfer Pump clearance

Hang restricted access signs on MCR entry swing gates

Op Test No.:	NRC	Scenario #	4	Event #	1	Page	13 of 65
Event Description:	**Controlling Pressurizer Level Channel, LT-459, fails HIGH**						

Time	Position	Applicant's Actions or Behavior
Lead Evaluator:		**When the crew has completed their board walk down and are ready to take the shift inform the Simulator Operator to place the Simulator in Run. When the Simulator is in run announce:** **CREW UPDATE – (SRO's Name) Your crew has the shift. END OF UPDATE**
Simulator Operator:		**When directed by the Lead Evaluator, ensure that the annunciator horns are on and place the Simulator in RUN.**
Evaluator Note:		**Event 1 is PRZ LT-459, failing high. The crew should respond IAW APP-ALB-009. The crew will be required to take Charging FCV-122 to manual and maintain PRZ level within the control band. There is also an additional failure when the RO attempts to return FCV-122 to AUTO the controller will be failed to Manual.**
Simulator Operator		**On cue from the Lead Evaluator actuate Trigger 1 (Controlling PRZ Level Instrument, LT-459, fails high),**
Indications Available		• **ALB-009-2-1, PRZ CONT HIGH LEVEL DEV & HTRS ON** • **ALB-009-4-2, PRESSURIZER HIGH LEVEL ALERT** • **Lowering Pressurizer level**
	RO	IDENTIFY a failed Pressurizer Level Channel
	SRO	Directs the actions of APP-ALB-009-4-2 or use OPS-NGGC-1000 for guidance
	RO	PLACE FCV-122, Charging Flow Control Valve, in manual.
Evaluator Note:		**Closing FCV-122 too far will reduce Regen Hx flow, and result in a Regen Hx High Temperature alarm.**
	RO	OPERATE FCV-122 as necessary to restore Pressurizer Level to the normal band

Op Test No.:	NRC	Scenario #	4	Event #	1	Page	14 of 65
Event Description:	**Controlling Pressurizer Level Channel, LT-459, fails HIGH**						

Time	Position	Applicant's Actions or Behavior
	SRO	Provides level bands and trip limits IAW OMM-001 Att. 13
OMM-001 Attach 13 - Control Bands and Trip Limits		**PRZ Level- Control Band 5% of Reference Level, Trip limits 10% low and 90% high**
	RO	SELECT 460/461 on Pressurizer Level Controller Selector
Evaluator Note:		• **ALB-009-2-1, PRZ CONT HIGH LEVEL DEV & HTRS ON Clears**
	BOP / RO	At the MCB recorder panel, ensure that the failed channel is not selected. - Selects NON - failed channel for recording
Evaluator Note:		**(Any Tech Spec evaluation can be conducted with a follow up question after the scenario).**
	SRO	Evaluate T.S. 3.3.1 - Action 6, With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied: a. The inoperable channel is placed in the tripped condition within 6 hours, and b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1. 3.3.3.5.a – minimum number of operable channels met 3.3.3.6 - minimum number of operable channels met **IF** the letdown line relief lifts the SRO should evaluate this TS: 3.4.6.2, action (b). With any RCS operational leakage greater than limits (RCS Identified leakage greater than 10 gpm), reduce the leakage rate to within limits within 4 hours or be in HOT STANDBY w/in the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Op Test No.:	NRC	Scenario #	4	Event #	1	Page	15 of 65

Event Description: **Controlling Pressurizer Level Channel, LT-459, fails HIGH**

Time	Position	Applicant's Actions or Behavior
	RO	Restore Charging to Automatic IAW OP-107 section 5.4 steps 14 and 15 (Requires shifting Master Controller to Manual and then back to Auto in order to remove integration. (May use instructions from OE database to restore charging to auto).
	RO	Identifies that FK-122.1 will not shift into AUTOMATIC control and informs the SRO
	SRO	Acknowledges communications with RO and directs RO to continue to operate FK-122.1 in manual. Contacts WCC for assistance. Completes an Equipment Problem Checklist, OMM-001 Attachment 5 Contacts WCC for assistance. (WR, EIR and Maintenance support) Directs BOP to implement OWP-RP-03
Simulator Communicator:		**When contacted for failure of FK-122.1 acknowledge request for assistance and state that you will contact Maintenance and develop a troubleshooting plan.** **When contacted for implementation of OWP-RP-03 state that you are still getting a crew together for OWP implementation and they will be there as soon as possible.**
Lead Evaluator:		**There is no intention to allow the crew to complete OWP-RP-03 prior to continuing with next event.** **When the plant has been stabilized and the crew has Pressurizer Level within 5% of control band Cue Event 2 "Plant Shutdown"**

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	16	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**When the plant has been stabilized and the crew has Pressurizer Level within 5% of control band the crew should precede with Event 2 "Plant Shutdown". If not, Cue Communicator to contact SRO as MSO and direct crew to commence a Plant Shutdown due to the expiring LCO for the 'B' MDAFW Pump.**
Communicator:		**If directed by the Lead Evaluator, contact SRO as MSO and direct crew to commence a Plant Shutdown due to the expiring LCO for the 'B' MDAFW Pump.**
GP-006		Normal Plant Shutdown From Power Operation to Hot Standby (MODE 1 to MODE 3)
	SRO	GP-006, Section 5.2 Step 4
Procedure Note:		When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows: • PORV PCV-444B will open at a lower than expected pressure. • ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure. • Increased probability for exceeding Tech Spec DNB limit for RCS pressure.

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	17	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**Crew may refer to OP-100 P&L 4.0.31 or Section 8.15**
	RO	ENERGIZE all available Pressurizer Backup Heaters. OP-100, Reactor Coolant System, Precaution and Limitations: 4.0.31. When energizing the Pressurizer Backup Heaters Groups "A" or "B", the following sequence should minimize the pressure increase and subsequent power transient. Place PK-444A in manual and raise the output to between 40% and 45% and then place PK-444A back in AUTO. Then promptly turn on the backup heaters.
Evaluator Note:		**Indicated PRNI power may increase >100% if the Turbine ramp is not started after energizing all Pressurizer Heaters. The crew may elect to begin boration prior to lowering turbine load.**
Procedure Note:		Routine load changes should be coordinated with the Load Dispatcher to meet system load demands.
OP-107.01	RO	OP-107.01, Section 5.2 and then 5.1
	RO	• DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board. • DETERMINE the magnitude of boron concentration increase required. • DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
Procedure Note:		FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	18	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
	SRO	Directs boration
Procedure Note:		Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.
	RO	• SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate. • VERIFY the RMW CONTROL switch has been placed in the STOP position. • VERIFY the RMW CONTROL switch green light is lit. • PLACE control switch RMW MODE SELECTOR to the BOR position.

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	19	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
Procedure Note:		When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows: • PORV PCV-444B will open at a lower than expected pressure. • ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure. • Increased probability for exceeding Tech Spec DNB limit for RCS pressure.
	RO	• OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm. o MAKE boron concentration adjustments as dictated from sample results.
Procedure Note:		At least 10 minutes should be allowed for mixing before a sample is taken.
	RO	• For large boron changes, PERFORM the following: o DIRECT Chemistry to sample the RCS for boron concentration. o MAKE boron concentration adjustments as dictated from sample results.
Procedure Note:		Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	20	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
Procedure Note:		During makeup operations following an alternate dilution, approximately 10 gallons of dilution should be expected due to dilution water remaining in the primary makeup lines.
	RO	• START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. • VERIFY boration automatically terminates when the desired quantity of boron has been added.
Procedure Caution:		The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.
Evaluator Note:		**During downpower with rods in automatic Control Bank 'D' will insert into the reactor.**
	RO	• VERIFY Tavg responds as desired. • IF rod control is in AUTO, THEN VERIFY the control rods are responding correctly. • VERIFY boration automatically terminates when the desired quantity of boron has been added. • PLACE Reactor Makeup in Auto per Section 5.1.
Evaluator Note:		**Additional steps are included in section 5.1 but not all will be applicable since the system just came out of Automatic. The only steps included here are the ones associated with switch manipulations.**

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	21	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
	RO	• VERIFY the RMW CONTROL switch: o Is in the STOP position. o The GREEN light is LIT. • PLACE the RMW MODE SELECTOR to AUTO. • START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. • Reports to CRS that boration is complete and Makeup is back in AUTO
	RO	• START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. • Verifies proper valve and pump alignment
Procedure Caution:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**
	RO	• VERIFY Tavg responds as desired. • IF rod control is in AUTO, THEN VERIFY the control rods are responding correctly. • VERIFY boration automatically terminates when the desired quantity of boron has been added. • PLACE Reactor Makeup in Auto per Section 5.1.
Evaluator Note:		**The following steps will initiate turbine load reduction IAW GP-006.**

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	22	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		A failure of the Vidar in the DEH computer has resulted in a plant trip in the past. This failure would affect operation in Operator Auto, and can be detected in either of the following ways: • If OSI-PI is available, the process book PLANTSTATUS.PIW, DEH Trends function of the Plant Process Computer: DEH (menu) contains a point for DEH MEGAWATTS. With a failure of the Vidar, this point will not be updating. • If OSI-PI is NOT available, accessing the ANALOG INPUTS screen on the Graphics display computer (in the Termination Cabinet room near the ATWS panel) will show several points, most of which should be updating if the Vidar is functioning properly. • If the DEH graphics computer is out of service, VIDAR can be checked as updating on the operator panel as follows: 1) DEPRESS TURBINE PROGRAM display button. 2) CHECK TURBINE PROGRAM display button is illuminated. 3) CHECK REFERENCE and DEMAND displays indicate 0000. 4) DEPRESS 1577. 5) DEPRESS "ENTER". 6) If the DEMAND display indicates 0000 then VIDAR is updating. 7) If the DEMAND display indicates 0001 then VIDAR is not updating.
Evaluator Note:		**There is no procedural guidance directing when the boration to lower power is required. The crew may elect to perform the boration prior to placing the Turbine in GO.**

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	23	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
	SRO	DIRECTS BOP to start power reduction at 4 DEH Units/Min. May direct initiation of a boration before the power reduction begins.
	BOP	Requests PEER check prior to manipulations of DEH Control
	BOP	• DEPRESS the LOAD RATE MW/MIN push-button. • ENTER the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display. (4 DEH Units/minute) • DEPRESS the ENTER push-button. • DEPRESS the REF push-button. • ENTER the desired load (120 MW per CRS) in the DEMAND display. • DEPRESS the ENTER push-button. The HOLD push-button should illuminate.
Procedure Note:		The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.
	BOP	• DEPRESS the GO push-button to start the load reduction and inform crew through 'Crew Update' Turbine in 'GO'. • VERIFY the number in the REFERENCE display decreases. • VERIFY Generator load is decreasing. • WHEN Turbine load is less than 95%, THEN VERIFY the 3A and 3B Feedwater Vents have been opened per OP-136, Section 7.2
Communicator:		**Acknowledge direction. No simulator response actions are required.**

Op Test No.:	NRC	Scenario #	4	Event #	2	Page	24	of	65
Event Description:		**Plant Shutdown (GP-006)**							

Time	Position	Applicant's Actions or Behavior
Lead Evaluator:		**A good initiation point for Event 3 is following the return of Makeup to AUTO.** **PRIOR to the crew reaching 95% power and once satisfied with observation of the power reduction, cue the Simulator Operator to insert Trigger 2. This will allow the Reactor power to remain able 90% for Event 6, the Major event initiator.** **Event 3 - "PR NIS Channel N-42 fails HIGH (AOP-001)"**

Op Test No.:	NRC	Scenario #	4	Event #	3	Page	25 of 65
Event Description:	**PR NIS Channel N-42 fails High (AOP-001)**						

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 3: Power Range NIS Channel 42 failure HIGH**
Indications Available		• **Uncontrolled rod motion/bistable trips.** • **ALB-013-4-1, Power Range High Neutron Flux High SP Alert** • **ALB-013-4-2, Power Range High Neutron Flux Rate Alert** • **ALB-013-4-5, Power Range Channel Deviation** • **ALB-013-5-1, Overpower Rod Stop** • **ALB-013-8-5, Computer Alarm Rod DEV/SEQ NIS PWR Range Tilts**
	RO	RESPONDS to alarms/uncontrolled rod motion.
AOP-001	SRO	ENTERS and directs actions of AOP-001, Malfunction of Rod Control and Indication System. Makes PA announcement for AOP entry Holds an Alignment Brief
	RO	PERFORMS AOP-001 Immediate Actions.
Evaluator Note:		**Rods cannot be withdrawn until AOP-001 actions have been implemented to clear the overpower rod stop.** **OWP-RP-24 provides the same actions as AOP-001 to clear the overpower rod stop.**
Immediate Action	RO	CHECK that LESS THAN TWO control rods are dropped. (YES)
Immediate Action	RO	POSITION Rod Bank Selector Switch to MAN.

Op Test No.:	NRC	Scenario #	4	Event #	3	Page	26 of 65
Event Description:	**PR NIS Channel N-42 fails High (AOP-001)**						

Time	Position	Applicant's Actions or Behavior
Immediate Action	RO	CHECK Control Bank motion STOPPED. (YES)
	SRO	Directs OAC to maintain OMM-001, Attachment 13 limits for control rods AND directs BOP to place the Turbine ramp on HOLD PROCEEDS to Section 3.2.
	BOP	Places Turbine DEH control to HOLD and informs CRS ramp on HOLD
	RO	CHECK that instrument channel failure has NOT OCCURRED by observing the following: • RCS Tavg (YES) • RCS Tref (YES) • POWER Range NI channels (NO, NI-42 Failed) • TURBINE first stage pressure (YES)
	SRO	RNO Actions: PERFORM the following: • IF a power supply is lost, THEN GO TO AOP-024, Loss of Uninterruptible Power Supply. (NO) • IF an individual instrument failed, THEN MAINTAIN manual rod control until corrective action is complete. (YES) • IF a Power Range NI Channel failed, THEN PLACE the affected NI Rod Stop Bypass switch to BYPASS at the Detector Current Comparator Drawer. (YES)
	BOP / RO	Proceeds to the Detector Current Comparator Drawer and places NI-42 Rod Stop Bypass switch to BYPASS • Reports completion of task to the SRO.

Op Test No.:	NRC	Scenario #	4	Event #	3	Page	27 of 65
Event Description:	**PR NIS Channel N-42 fails High (AOP-001)**						

Time	Position	Applicant's Actions or Behavior
	RO	Manually OPERATE affected control bank to restore the following: • Equilibrium power and temperature conditions • Rods above the insertion limits of Tech Spec 3.1.3.6 and PLP-106, Technical Specification Equipment List Program and Core Operating Limits Report. • Withdraws Control Bank 'D' to restore Tave with Tref.
	RO	VERIFY proper operation of the following: (YES) o CVCS demineralizers o BTRS o Reactor Makeup Control System
	SRO	CHECK that this section was entered due to control banks MOVING OUT. (NO) GO TO Step 6.
	SRO	CHECK that NEITHER of the following OCCURRED: (NO) o Unexplained RCS Boration o Unplanned RCS dilution
	SRO	CHECK that an automatic Rod Control malfunction OCCURRED. (NO) GO TO Step 9.
	SRO	EXIT this procedure.
	SRO	• Informs crew the downpower with control rods in Manual • Refer to OWP-RP-24 to remove channel from service. • Direct operator and I&C to perform OWP-RP-24 • Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist for the failure of NI-42 • Contacts WCC for assistance / generation of Work Request

Op Test No.:	NRC	Scenario #	4	Event #	3	Page	28 of	65
Event Description:	**PR NIS Channel N-42 fails High (AOP-001)**							

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**Any Tech Spec evaluation may be completed with a follow-up question after the scenario.**
	SRO	Enters Instrumentation TS 3.3.1 Functional Unit 2, 3, and 4 ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels. STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied: a. The inoperable channel is placed in the tripped condition within 6 hours. b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1. and c. Either, THERMAL POWER is restricted to less than or equal to 75% of RATED THERMAL POWER and the Power Range Neutron Flux Trip Setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER within 4 hours; or,. the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours per Specification 4.2.4.2.3.3.1 **Reference the below T.S. but it will not apply for this conditions because 3 instruments is the Minimum Number required** 3.3.1 Functional Unit 19 b, c, and d. ACTION 7 - With less than the Minimum Number of Channels OPERABLE, within 1 hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3.

Op Test No.:	NRC	Scenario #	4	Event #	3	Page	29 of 65
Event Description:	PR NIS Channel N-42 fails High (AOP-001)						

Time	Position	Applicant's Actions or Behavior
Simulator Communicator:		Acknowledge request and reports from SRO. IF asked to report to MCR to perform OWP-RP-24 state that you will report as soon as possible.
Evaluator Note:		Rod Control will remain in Manual the remainder of the scenario
Simulator Operator:		Rod Control will remain in Manual it is not required to implement the OWP prior to continuing with the scenario.
Lead Evaluator:		Note: Any Tech Spec evaluation may be completed with a follow-up question after the scenario. Note: I&C field activities are not required to be completed before continuing with the next event. Note: It is not required for Tave to match Tref or Rod Control to be placed in Automatic before continuing with the next event. After Control Bank 'D' have been withdrawn to restore Tave with Tref, cue Simulator Operator to insert Trigger 4 Event 4 – "Main Generator Voltage Regulator Failure"

Op Test No.:	NRC	Scenario #	4	Event #	4	Page	30 of 65
Event Description:	**Main Generator Voltage Regulator Failure**						

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**When directed by Lead Evaluator: Actuate Trigger 4 "Main Generator Voltage Regulator failure"**
Evaluator Note:		**The first indication of this malfunction is changing MVARS on the ERFIS computer screen. This indication will change approximately 3 minutes before the associated alarm indications are received**
Indications Available:		• **MVARS increasing on ERFIS** • **ALB-22-9-4 COMPUTER ALARM GEN/EXCITER SYSTEMS** • **ALB-22-6-3 GENERATOR EXCITER MAX EXCITATION TIMING** • **ALB-22-4-5 GENERATOR EXCITER FIELD FORCING** • **ALB-22-6-5 GENERATOR EXCITER MAX EXCITATION & LIMITING** • **ALB-20-5-5 COMPUTER ALARM MS/TURBINE SYSTEMS**
	BOP	RESPONDS to alarms ALB-022-9-4 and 6-3.
ALB-022	BOP	ENTERS APP-ALB-022-9-4 then 6-3. NOTE: Guidance for also exists in APP-ALB-022-4-3 and OPS-NGGC-1000 for manual voltage regulator operation.
Evaluators Note:		**Alarm ALB-022-9-4 is a computer alarm. ALB-022-6-3 will initiate corrective actions.** **The crew may refer to AOP-006, Turbine Generator Trouble but no actions will result.**

Op Test No.:	NRC	Scenario #	4	Event #	4	Page	31 of 65
Event Description:	**Main Generator Voltage Regulator Failure**						

Time	Position	Applicant's Actions or Behavior
	BOP	CONFIRM alarm using: AT MCB: • EI-525, Generator Frequency. • EI-520, Generator Phase Volts. (YES-Reports voltage regulation problem) • EI-540, Gen Exciter Field Volts. • EI-541, Gen Exciter Field Current. VERIFY Automatic Functions: • VOLTAGE Regulator Limiter decreases Generator excitation. • IF Voltage Limiter is unable to control excitation increase, a Generator Lockout occurs.
	BOP	PERFORM Corrective Actions: • CHECK for the following at MCB: • EI-525, Generator Frequency, stable at 60 Hz. (YES) • EI-520, Generator Phase Volts, stable at 22 KV. (NO) • EI-540, Gen Exciter Field Volts stable. (Slowly rising) • EI-541, Gen Exciter Field Current stable. (Slowly rising)
Procedure Note:		An automatic transfer to manual Generator voltage control is indicated by GENERATOR VOLTAGE REGULATOR switch ON and the GREEN light LIT. Both the AMBER light and RED light will be OFF.

Op Test No.:	NRC	Scenario #	4	Event #	4	Page	32 of	65
Event Description:	**Main Generator Voltage Regulator Failure**							

Time	Position	Applicant's Actions or Behavior

	BOP	ALB-022-6-3
		• OPERATE GENERATOR VOLTAGE ADJUSTER switch to restore Generator voltage to 22 KV and reduce MVARS.
		• IF GENERATOR VOLTAGE ADJUSTER switch is ineffective THEN PERFORM the following to transfer and maintain voltage manually:
		  • OPERATE the GENERATOR VOLTAGE ADJUSTER to attempt to zero the REGULATOR OUTPUT BAL VOLT meter.
		  • PLACE GENERATOR VOLTAGE REGULATOR switch in the TEST position and observe AMBER light LIT and RED light OFF.
		  • OPERATE GENERATOR BASE ADJUSTER switch to restore Generator voltage to 22 KV.
		  • NOTIFY Load Dispatcher within 30 minutes of an Automatic Voltage Regulator status change. (The notification shall include an explanation of the status change and an estimate of expected duration.)
		• VERIFY Generator is operating per the Generator Capability Curve.
		• DISPATCH an operator to 286 TB Switchgear Room to check WTA Exciter Switchgear Maximum Excitation Limiter voltage.

Simulator Communicator:		**If dispatched to 286' Switchgear to inspect WTA Exciter Switchgear voltage regulator locally, wait approximately 2 minutes and report that there are no abnormal indications at the WTA Exciter Switchgear voltage regulator.**
	SRO	REFERENCE AOP-028, Grid Instability. (N/A – the problem is not on the grid)
	BOP	VERIFY Main Generator is operating per the Generator Capability Curve.

Op Test No.:	NRC	Scenario #	4	Event #	4	Page	33 of 65
Event Description:	**Main Generator Voltage Regulator Failure**						

Time	Position	Applicant's Actions or Behavior
	SRO/BOP	Contacts Load Dispatcher and provides information that the Voltage regulator is in manual • 30 minute requirement per ALB-022-4-5 • 60 minute requirement per OMM-001, Att. 12
Simulator Communicator:		**Acknowledge report from Control Room**
	SRO	Contacts WCC for support and fills out Equipment Problem Checklist Provides control band to BOP for MVAR control based on OP-153.01 normal limits • 75 to 175 MVAR if above 750 MWe • 65 to 175 MVAR if 550 to 750 MWe
Simulator Communicator:		**Acknowledge request and reports from SRO.**
Evaluators Note:		**After the Generator Voltage Regulator is stabilized insert Event 5 "Trip of the running ESCWS Chiller WC-2 A-SA"**

Op Test No.:	NRC	Scenario #	4	Event #	5	Page	34 of 65
Event Description:	**'A' Essential Services Chilled Water Pump Trip**						

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**When directed by Lead Evaluator: Actuate Trigger 5 "Trip of the running ESCWS Chiller WC-2 A-SA"**
Indications Available:		• **ALB-23-1-18 CHILLER WC2-A TROUBLE**
	BOP	• RESPONDS to alarm on ALB-23 (1-18). • REPORTS WC-2A-SA tripped.
AOP-026		LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM
	SRO	ENTERS AOP-026, LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM Makes PA announcement for AOP entry
Procedure Note:		**This procedure contains no immediate actions.**
	BOP	CHECK the in-service chiller RUNNING. (NO)
	CREW	DISPATCH an operator to determine the cause of the chiller trip.
Simulator Communicator:		**When contacted, wait 2 minutes and then the TB AO report that the breaker for the chiller has tripped on overcurrent and as the RAB AO report that there are no visible problems locally at the chiller.**
	BOP	PERFORM the following using OP-148, Essential Service Chilled Water System: START the Standby chiller (Start P-4B and 'B' Chiller) section 5.1 or 5.2 of OP-148.

Op Test No.:	NRC	Scenario #	4	Event #	5	Page	35 of 65
Event Description:	'A' Essential Services Chilled Water Pump Trip						

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**OP-148 and OP-172 can be found at the end of the guide in Attachment 1.** **Section 5.2 of OP-148 may be used if crew determines that loss will be short term.**
Simulator Communicator:		**If contacted, report "Pre-start checks on P-4B and 'B' Chiller are complete." No simulator booth operations are required.**
OP-148, Section 5.1 or Section 5.2		NOTE: Due to crew preference the OP-148 sections are located at the end of this guide in Attachment 1. The BOP will perform the actions of the OP procedure.
Simulator Communicator:		**IF contacted by the BOP to RESET the Low Chilled Water Flow alarm, wait 15 seconds and then report "The Low Chilled Water No Flow Alarm has been reset, and there are no other alarms." There are NO simulator operations required.**
	CREW	CONTACT Maintenance as necessary for troubleshooting and appropriate corrective actions.
	CREW	Makes a PA announcement prior to starting chiller.
Evaluator NOTE:		**Chiller start is delayed for 30 seconds after switch is placed in start.**

Op Test No.:	NRC	Scenario #	4	Event #	5	Page	36 of 65
Event Description:	**'A' Essential Services Chilled Water Pump Trip**						

Time	Position	Applicant's Actions or Behavior
	BOP	CHECK EITHER chiller STARTED. (YES) VERIFY the following AH units for the operating train chiller are RUNNING: • AH-15, Control Room Normal Supply • AH-17, Fuel Vent FP Pump Room Fan Cooler • AH-16, Elec Equip Prot Rm Supply VERIFY the following alarm is CLEAR for the running chiller • ALB-23-1-20, Expansion TK A LO-LO Level • ALB-23-2-20, Expansion TK B LO-LO Level
	SRO	REFER TO Tech Spec 3.7.13. At least two independent Essential Services Chilled Water System loops shall be OPERABLE. • ACTION: With only one ESCW System loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HSB within the next 6 hours and in CSD within the following 30 hours.
	SRO	• Contacts WCC for Work Request and EIR. Contacts Maintenance to investigate and fills out an Equipment Problem Checklist. • Obtains OWP-ECW • Direct BOP to perform Train Swap
	BOP	Start the corresponding air handlers IAW OP-172 section 5.6
	SRO	EXIT this procedure.
Evaluators Note:		**After the ESCWS Chiller is running and the BOP has returned to monitor the MCB then - Initiate Event 6 "MFW Pump '1B' Breaker Trips "**

Op Test No.:	NRC	Scenario #	4	Event #	6	Page	37 of	65
Event Description:		**MFW pump 1B Trips**						

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**When directed by Lead Evaluator: Actuate Trigger 6 MFW Pump '1B' Breaker Trips**
Indications Available:		• **All SG NR levels decrease, then start to return to program level as FRVs respond to level deviation** **The following alarms may come in:** • **ALB-016-1-4, FW Pump A/B O/C Trip- Gnd Or Bkr Fail To Close** • **ALB-014-1(2)(3)-1B SG A(B)(C) NR LEVEL/ SP HI / LO DEV** • **ALB-014-8-5 COMPUTER ALARM SG**
	BOP	• RESPONDS to changing SG NR levels and identifies MFW Pump '1B' Breaker has Tripped • Notifies SRO
	CREW	Identifies AOP-010 entry condtions
AOP-010		Feedwater Malfunctions
Immediate Action	BOP	**CHECK** ANY Main Feedwater Pump TRIPPED. **(YES)**
Immediate Action	BOP	**CHECK** initial Reactor Power less than 90%. **(NO)**
Immediate Action	BOP	**RNO: TRIP** the Reactor AND GO To EOP-E-0

Op Test No.:	NRC	Scenario #	4	Event #	6	Page	38 of 65
Event Description:		**MFW pump 1B Trips**					

Time	Position	Applicant's Actions or Behavior
	SRO	Directs the OAC to manually trip the Reactor per AOP-010
	RO	Manually Trips the Reactor

Op Test No.:	NRC	Scenario #	4	Event #	7	Page	39 of 65
Event Description:		Loss of Offsite Power, Reactor Trip					

Time	Position	Applicant's Actions or Behavior
E-0		Reactor Trip Or Safety Injection
	SRO	Steps through immediate actions with crew Makes plant PA announcement
Immediate Action	RO	Verifies Reactor is Tripped (YES) REACTOR TRIP CONFIRMATION Reactor Trip AND Bypass BKRs - OPEN Rod Bottom Lights (Zero Steps) - LIT Neutron Flux - DROPPING
Immediate Action	BOP	Verifies Turbine is Tripped – All throttle valves shut (YES) TURB STOP VLV 1 TSLB-2-11-1 TURB STOP VLV 2 TSLB-2-11-2 TURB STOP VLV 3 TSLB-2-11-3 TURB STOP VLV 4 TSLB-2-11-4
Evaluator Note:		**Either the BOP or RO should identify that 'A' ESP pump did not start from the sequencer operation or on low pressure.** **BOP- Identifies that Load block 2 for the 'A' ESW pump did not start the 'A' ESW pump.** **RO – Identifies control board misalignment – AFTER the immediate actions AND Load Block 9 is reached the RO should attempt to start the 'A' ESW pump.** **Since the pump will not start the crew should take the immediate actions of AOP-022 and secure the 'A' EDG and the 'A' CSIP (securing the 'A' CSIP will be accomplished if the 'A' EDG is secured first.**

Op Test No.:	NRC	Scenario #	4	Event #	7	Page	40 of 65
Event Description:		**Loss of Offsite Power, Reactor Trip**					

Time	Position	Applicant's Actions or Behavior
Immediate Action	BOP	Verify Power To AC Emergency Buses (YES) AC emergency buses – AT LEAST ONE ENERGIZED (YES – 'A' Emergency Bus – 'B' Emergency Bus –NO) Identifies that the 'B' EDG output breaker 126 has tripped prior to the sequencer reaching Load Block 9 Identifies that Load block 2 for the 'A' ESW pump did not start the 'A' ESW pump
Procedure Note:		Emergency bus restoration is NOT considered an immediate action.
	SRO / BOP	As time allows restore power to de-energized emergency bus. (Refer to AOP-025, "LOSS OF ONE EMERGENCY AC BUS (6.9KV) OR ONE EMERGENCY DC BUS (125V)".)
Immediate Action	RO	Safety Injection Activated (NO) RNO action: Perform the following: a) Check Safety Injection – REQUIRED (NO) SI ACTUATION CRITERIA PRZ Pressure - LESS THAN OR EQUAL TO 1850 PSIG CNMT Pressure - GREATER THAN OR EQUAL TO 3.0 PSIG Any SG Pressure - LESS THAN OR EQUAL TO 601 PSIG Manual - DEGRADATION TOWARDS AUTOMATIC ACTUATION Abnormal Operating Procedure - DIRECTS MANUAL ACTUATION One SI Train - FAILED (BPLP 4-1 FLASHING) b) IF Safety Injection actuation is NOT required, THEN GO TO ES-0.1, "REACTOR TRIP RESPONSE", Step 1.

Op Test No.:	NRC	Scenario #	4	Event #	8	Page	41 of 65
Event Description:			Loss of ALL AC power				

Time	Position	Applicant's Actions or Behavior
EOP ES-0.1		Reactor Trip Response
Procedure Note:		Foldout applies
	SRO	Assigns foldout items of E-0 to both the RO and BOP • RO: o SI Actuation criteria • BOP o AFW supply switchover criteria
Evaluator Aide:		
FOLDOUT • **SI ACTUATION CRITERIA** IF any of the following occurs, THEN actuate SI AND GO TO E.0, "REACTOR TRIP OR SAFETY INJECTION", Step 1: • RCS subcooling - LESS THAN 10° F - C 20° F - M • PRZ level - CAN NOT BE MAINTAINED GREATER THAN 5% • **AFW SUPPLY SWITCHOVER CRITERIA** IF CST level drops to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.		
	SRO	Evaluate EAL Matrix.
	SRO	Contacts AO's to investigate problem with 'B' EDG and WCC for assistance on 'A' ESW pump and 'B' EDG

Op Test No.:	NRC	Scenario #	4	Event #	8	Page	42 of 65
Event Description:			Loss of ALL AC power				

Time	Position	Applicant's Actions or Behavior
Simulator Communicator:		**Acknowledge any requests from the crew may request for assistance and AO support.** **IF pressed for report on failures state that you don't see any indications of problems but both Maintenance and Engineering are looking into the failures. If anything is determined you will report back to the MCR with the findings.**
Evaluator Note:		**The critical task of stopping the 'A' and 'B' CSIP may be accomplished by Emergency stopping the 'A' and 'B' EDG.**
Critical Task #2 Critical Task #3	Crew	Identifies that 'A' ESW pump is NOT running, attempts to start the 'A' ESW pump and identifies that the pump has failed to Auto start and will NOT start manually by the MCB switch. Identifies that 'B' ESW pump is NOT running, does NOT attempt to start the 'B' ESW pump and identifies that the pump has NO power due to Breaker 126 tripping open. They then perform the Immediate actions of AOP-022 and 1. Secures the 'A' and 'B' EDG by taking it to Emergency Trip 2. Stops the 'A' and 'B' CSIP Critical to Stop the 'A' CSIP and Emergency Stop the 'A' Emergency Diesel Generator prior to failure due to overheating Critical to Stop the 'B' CSIP and Emergency Stop the 'B' Emergency Diesel Generator prior to failure due to overheating

Op Test No.:	NRC	Scenario #	4	Event #	8	Page	43 of 65
Event Description:			Loss of ALL AC power				

Time	Position	Applicant's Actions or Behavior
Simulator Communicator:		**IF the crew request that you MANUALLY close the breaker for 'A' ESW pump acknowledge the request – wait approximately 2 minutes and communicate that the breaker will NOT close. You have tried to rack out and rack in the breaker but it is stuck in the cabinet. You called WCC who is getting assistance from the Electrical Maintenance and Engineering.**
	Crew	AFTER Emergency Stopping the 'A' EDG Transition to ECA-0.0 for loss of ALL AC power

EOP ECA-0.0		Loss of All AC Power
Procedure Note:		Steps 1 AND 2 are immediate action steps. • Critical Safety Function Status Trees should be monitored for information only. • Function Restoration procedures should NOT be implemented unless directed by this procedure.
	SRO	Enter ECA-0.0 Makes PA announcement for EOP entry Crew performs immediate actions (Steps 1 and 2)
Immediate Action	RO	Verify Reactor Trip: REACTOR TRIP CONFIRMATION Reactor Trip AND Bypass BKRs - OPEN Neutron Flux - DROPPING o Trip breakers RTA AND BYA – OPEN (YES) o Trip breakers RTB AND BYB – OPEN (YES) o Neutron flux – DECREASING (YES)

Op Test No.:	NRC	Scenario #	4	Event #	8	Page	44 of 65
Event Description:			Loss of ALL AC power				

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**The BOP is required to check Turbine throttle valve positions using status light indications. With a loss of power all other MCB indications for the Turbine throttle and governor valves have no indication.**
Immediate Action	BOP	Verify Turbine Trip – ALL THROTTLE VALVES SHUT TURB STOP VLV 1 TSLB-2-11-1 TURB STOP VLV 2 TSLB-2-11-2 TURB STOP VLV 3 TSLB-2-11-3 TURB STOP VLV 4 TSLB-2-11-4 • All turbine throttle valves – SHUT (YES)
	RO	**Check If RCS Isolated** Check letdown isolation valves - SHUT: • 1CS-1 (LCV-460) (YES) • 1CS-2 (LCV-459) (YES) Check PRZ PORVs – SHUT (YES) Verify excess letdown valves - SHUT: • 1CS-460 (YES) • 1CS-461 (YES)
Evaluator Note:		**A caution prior to step 1 of ECA-0.0 states that Function Restoration Procedures should be monitored but not implemented unless directed by ECA-0.0. The loss of all Feedwater will cause a RED path for Heat Sink (FR-H.1) but the SRO should NOT transition to this procedure.**

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	45 of 65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**					

Time	Position	Applicant's Actions or Behavior
	BOP	**Verify AFW Flow AND Control SG Levels:** • Verify AFW Flow – GREATER THAN 210 KPPH (NO) • Reports to SRO (or identifies 1MS-70 and 1MS-72 are not open and OPENS one or both valves)
	SRO	Directs BOP to verify the TDAFW pump is running (NO) Directs BOP to open either 1MS-70 or 1MS-72
Event 9 Critical Task #1	BOP	Opens 1MS-70 or 1MS-72 and establishes a minimum of 210 KPPH to the Steam Generators by adjusting TD AFW pump speed. Critical to open either valve and establish flow to the Steam Generators Any level - GREATER THAN 25% [40%] (NO) Control AFW flow to maintain all intact levels between 25% and 50% [40% and 50%]
	SRO	Evaluate EAL Matrix
	BOP	Verify AC Emergency Bus Cross-Ties to Non-Emergency AC Buses - OPEN
	BOP	Verify any cross tie to Bus 1A-SA - OPEN o Breaker 104 o Breaker 105 Verify Any cross tie to Bus 1B-SB - OPEN o Breaker 124 o Breaker 125

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	46 of 65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**					

Time	Position	Applicant's Actions or Behavior
Simulator Communicator:		**Call the MCR as the Load Dispatcher. Inform the crew that a major grid transient caused the loss of the HNP switch yard. The fault has been isolated and the switch yard has been restored. Harris Station has permission to restore offsite power to 6.9 KV buses and to reset any tripped Start Up Transformer lockout relays.**
Simulator Operator:		**Run Trigger 13 NOW – this deletes loss of offsite power**
Procedure Caution:		• Emergency stopping an EDG will deenergize the field flashing circuit and prevent a fire in the GCP control section. • Do NOT start any EDG that is emergency stopped OR close any tripped EDG output breaker until problem corrected.

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	47 of 65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**					

Time	Position	Applicant's Actions or Behavior
	BOP	ECA-0.0 Step 7 Check EDGs 1A-SA AND 1B-SB - AVAILABLE (FOR START FROM MCB) Check all of the following for EDG 1A-SA: • DIESEL GENERATOR A TRIP annunciator [ALB-024-3-1] - CLEAR (NOT PRESENT) – NO • DIESEL GENERATOR A START FAILURE annunciator [ALB-024-3-3] - CLEAR (NOT PRESENT) - YES • Breaker 106 - NORMAL (NOT TRIPPED) - YES RNO for A EDG: Place the EDG 1A-SA emergency stop switch to EMERG STOP. (Already done from failure of 'A' ESW pump) Check all of the following for EDG 1B-SB: • DIESEL GENERATOR B TRIP annunciator [ALB-025-3-1] - CLEAR (**NOT** PRESENT) **(NO)** • DIESEL GENERATOR B START FAILURE annunciator [ALB-025-3-3] - CLEAR (**NOT** PRESENT) (**NO** – B EDG has failed to start) • Breaker 126 - NORMAL (**NOT** TRIPPED) **(NO)** RNO for B EDG: Place the EDG 1B-SB emergency stop switch to EMERG STOP. (Locates Emergency Stop MCB switch and places switch to EMERG STOP position) Check any EDG – AVAILABLE (NOT Emergency Stopped) (NO - Neither EDG is available) IF NO EDG available, THEN GO To Step 9

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	48 of	65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**						

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**The crew should NOT make any attempts to close the B EDG output breaker from the MCR. IF they do the breaker WILL close BUT they would have dismissed the procedure Caution AND would have energized a bus without knowing what faults might exist on the bus. This would be a dangerous and non conservative decision.** **The crew should ALSO make a decision to ONLY restore power to the 'A' Emergency bus until what caused the 'B' EDG output breaker trip is determined. The cause could be something is wrong on the B bus (a bus fault) and re-energizing the bus would be dangerous and non conservative as well.**
	BOP	Energize AC Emergency Buses From Offsite Power:
Critical Task #4	BOP	Perform Attachment 1, RESTORATION OF OFFSITE POWER TO EMERGENCY BUSES **(Critical to restore power to 1 Emergency Bus)**
Attachment 1		Restoration of Offsite Power to Emergency Buses
Procedure Caution:		**Tripping of a Start Up XFMR lockout relay indicates a major fault on the XFMR. Re-energizing the XFMR may cause additional damage and should NOT be done without dispatcher's permission.**
	BOP	Obtain Load Dispatcher's permission prior to performing the following: Restoring offsite power to 6.9 KV buses (YES) Resetting any tripped Start Up XFMR lockout relays (YES)

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	49 of	65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**						

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**Steps 2 through 8 restore power to Bus A-SA and Steps 9 through 15 restore power to Bus B-SB.**
	CREW	Determine power should ONLY be restored to Bus A-SA therefore the BOP should perform steps 2 through 8
	BOP	Performs actions of EOP-EPP-001 Attachment 1 steps 2-8
	BOP	Att. 1 Step 2 On Start Up XFMR Protective Relay Panel 1A, verify off-site power to Start Up Aux XFMR A by performing the following: Verify the Start Up XFMR 1A Lockout SU 1A Relay is reset. Verify any of the following switch yard tie breakers are closed to energize Start Up XFMR A: • Breaker 52-2 • Breaker 52-3
	BOP Step 3	Restore offsite power to 6.9 KV Aux Bus D: Place Start Up XFMR To Aux Buses A & D Synchronizer control switch to BREAKER 101 position. Close Start Up XFMR B To Aux Bus E Breaker 101. Place Start Up XFMR To Aux Buses A & D Synchronizer control switch to OFF.
	BOP Step 4	Verify Aux Bus D To Emergency Bus A-SA Breaker 104 – CLOSED
	BOP Step 5	Verify Diesel Generator A-SA Breaker 106 A SA - OPEN

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	50 of 65
Event Description:	**1MS-70 and 1MS-72 fail to auto open**						

Time	Position	Applicant's Actions or Behavior
	BOP Step 6	Energize 6.9 KV Bus A-SA: Place Emergency Bus A-Sa To Aux Bus D Synchronizer control switch to SYNC. Close Emergency Bus A-SA To Aux Bus D Tie Breaker 105. Place Emergency Bus A-SA To Aux Bus D Synchronizer control switch to OFF.
	BOP Step 7	Close the following 6.9 KV breakers: • Emergency Bus B-SB To XFMR B1-SB Breaker B1 A-SB • Emergency Bus B-SB To XFMR B3-SB Breaker B3 A-SB
	BOP Step 8	Verify 6.9 KV Emergency Bus B-SB To XFMR B2-SB Breaker B2 A-SB –CLOSED Report to SRO that Attachment 1 is completed for B-SB emergency bus and power is restored to bus from offsite. Report to CRS that 'A' Emergency bus power has been restored from offsite source.
	SRO	Acknowledges restoration of power to the 'A' Emergency Bus and continues with ECA-0.0 step 9.b
Evaluator Note:		This is where the scenario would end IF the crew does not continue and energized the 'B' Emergency bus. IF they continue with energizing the 'B' Emergency bus let them complete the actions then end the scenario.
	SRO	Step 9.b Check any AC emergency bus – ENERGIZED • 1A-SA bus voltage (YES) • 1B-SB bus voltage (NO)

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	51 of 65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**					

Time	Position	Applicant's Actions or Behavior
	SRO	Initiate monitoring of Critical Safety Function Status Trees.
	SRO	RETURN TO procedure and step in effect. Returns to ES-0.1

Lead Evaluator:	**Terminate the scenario upon exit from ECA-0.0** **Announce 'Crew Update' End of Evaluation** **Have crew remain in the Simulator without discussing the exam. Examiners will formulate any follow-up questions.**

Simulator Operator:	**When directed by the Lead Examiner place the Simulator in FREEZE.**

Evaluator Note:		**IF the crew did NOT determine that they should NOT have energized the 'B' Emergency bus the following steps have been included to follow the actions of the BOP.**
	BOP	Att. 1 Step 9 On Start Up XFMR Protective Relay Panel 1B, verify off-site power to Start Up Aux XFMR B by performing the following: Verify the Start Up XFMR 1B Lockout SU 1B Relay is reset. Verify any of the following switch yard tie breakers are closed to energize Start Up XFMR B: • Breaker 52-13 • Breaker 52-14
	BOP Step 10	Restore offsite power to 6.9 KV Aux Bus E: Place Start Up XFMR To Aux Buses B & E Synchronizer control switch to BREAKER 121 position. Close Start Up XFMR B To Aux Bus E Breaker 121. Place Start Up XFMR To Aux Buses B & E Synchronizer control switch to OFF.

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	52 of	65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**						

Time	Position	Applicant's Actions or Behavior
	BOP Step 11	Verify Aux Bus E To Emergency Bus B-SB Breaker 124 - CLOSED
	BOP Step 12	Verify Diesel Generator B-SB Breaker 126 B SB - OPEN
	BOP Step 13	Energize 6.9 KV Bus B-SB: Place Emergency Bus B-SB To Aux Bus E Synchronizer control switch to SYNC. Close Emergency Bus B-SB To Aux Bus E Tie Breaker 125. Place Emergency Bus B-SB To Aux Bus E Synchronizer control switch to OFF.
	BOP Step 14	Close the following 6.9 KV breakers: • Emergency Bus B-SB To XFMR B1-SB Breaker B1 A-SB • Emergency Bus B-SB To XFMR B3-SB Breaker B3 A-SB
	BOP Step 15	Verify 6.9 KV Emergency Bus B-SB To XFMR B2-SB Breaker B2 A-SB –CLOSED Report to SRO that Attachment 1 is completed for B-SB emergency bus and power is restored to bus from offsite.
	SRO	Step 9.b Check any AC emergency bus – ENERGIZED • 1A-SA bus voltage (YES) • 1B-SB bus voltage (YES) – **Should not have…**
	SRO	Initiate monitoring of Critical Safety Function Status Trees.

Op Test No.:	NRC	Scenario #	4	Event #	9	Page	53 of	65
Event Description:		**1MS-70 and 1MS-72 fail to auto open**						

Time	Position	Applicant's Actions or Behavior
	SRO	RETURN TO procedure and step in effect. ES-0.1
Lead Evaluator:		**Terminate the scenario upon exit from ECA-0.0** **Announce 'Crew Update' End of Evaluation** **Have crew remain in the Simulator without discussing the exam. Examiners will formulate any follow-up questions.**

Simulator Operator:	**When directed by the Lead Examiner place the Simulator in FREEZE.**

5.0 STARTUP

5.1. Startup Train A-SA (B-SB) from Main Control Room or Local Panel

5.1.1. Initial Conditions

NOTE: Section 5.2, Placing Standby Train in Operation, should be used when swapping Trains of ESCWS.

1. No Chiller Train is in service. _____
2. System filled and vented per Section 8.1. _____
3. System lineup Attachments 1 and 2 are complete. _____
4. For non-emergency starts the prestart checks of Attachment 5 have been performed and an operator should be present to observe start of chiller. _____
5. Section 8.12 Manual Chiller Reset has been performed, if necessary due to chiller trip. _____
6. The L.O. heaters have been in service for twelve hours. (See Precaution and Limitation 4.0.3 for applicability of this Initial Condition) _____

NOTE: If service water header temperature is greater than 85°F and the ESW pump is available startup of ESW is required. The pump should run for approximately 30 minutes before chiller start. ESW provides additional flow at typically lower temperatures when used for service water supply. Starting ESW prior to a chiller start minimizes condenser pressure. Historically, High Condenser Pressure alarms have been received during summer months due to high service water temperatures and high chilled water loads.

7. IF desired due to Service Water temperatures being high,
   THEN VERIFY a same train ESW Pump is running. Pump should run for approximately 30 minutes before chiller start. _____

5.1.2. Procedural Steps

NOTE: Whenever an "A" Train component is referred to in the body of this procedure it's "B" Train counterpart will immediately follow, enclosed by parentheses.

NOTE: ESR 99-00142 has evaluated and determined that long-term closure of the supply and return valves to the NNS AH units will not affect operability of the Essential Services Chiller system. The next two steps will align the NNS AH units however, if it is desired to maintain the NNS isolation valves shut, then steps 5.1.2.1 and 5.1.2.2 may be skipped.

1. **ISOLATE** the supply and return valves to the NNS AH units from the train that will not be placed in service by shutting the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	_____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	_____

2. **ALIGN** the supply and return valves to the NNS AH units associated with the train that will be placed in service by opening the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	_____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	_____

5.1.2 Procedural Steps (continued)

NOTE: The local alarm indication for low chilled water flow and low chilled water temperature will lock in until manually reset at the WC-2 control panel.

3. START WC-2 Chiller 1A-SA (1B-SB) Chilled water pump P-4 to establish chilled water flow. _____

4. At the Local Control panel, RESET the Low Chilled Water Flow alarm using the CHILLED WATER NO FLOW TRIP INDICATION RESET push-button _____

5. IF starting the chiller for the first time following maintenance where the chiller lube oil heater circuit was under clearance.
THEN PERFORM the following:

   a. Locally START the oil pump on the 1A-SA (1B-SB) compressor by taking the control switch on the local panel to the MAN position. _____

   b. RUN pump for 5 minutes. _____

   c. STOP the oil pump on the 1A-SA (1B-SB) chiller compressor by taking the control switch on the local panel to the AUTO position. _____

6. At the Local Control Panel, CHECK that all alarm lights are NOT lit. _____

7. IF any alarm light(s) is lit,
THEN PERFORM the following:

   a. IF the Local Select switch is in the LOCAL position,
   THEN locally DEPRESS the STOP push-button. _____

   b. IF the Local Select switch is in the MCB HVAC position,
   THEN place the 1A-SA (1B-SB) compressor control switch on ACP-1 to STOP. _____

   c. IF any alarm light is still lit,
   THEN PERFORM the following:

      (1) DECLARE the chiller inoperable. _____

      (2) INITIATE corrective actions. _____

5.1.2 Procedural Steps (continued)

NOTE: If the unit cycles off due to low chilled water flow or low chilled water temperature, the unit will automatically restart if all start permissive conditions exist.

NOTE: An anti-recycle feature prevents more than one normal start within a 30 minute period. This anti-recycle feature is bypassed upon any automatic start signal from the ESF sequencer.

NOTE: After going to START on the Chiller Control Switch, the oil pump will start and bring oil pressure up to normal operating pressure prior to chiller start.

NOTE: OPT-1512 rotates the Temperature Control Point potentiometer to clean the surfaces. While OPT-1512 restores the potentiometer to its original position, it is possible that due to the surface cleaning the characteristics of the potentiometer have changed sufficiently to require a manual temperature adjustment per Section 8.14 of this procedure. This will be determined by monitoring temperature after chiller start in the following Step.

NOTE: ALB-023/1-14 (2-14), WC-2 CH 1A (1B) CNDSR REFRIG HI PRESS, may alarm during startup of the Chillers. High chiller condenser pressure is caused by inadequate cooling of the refrigerant. Causal factors for high condenser pressure include high chiller service water inlet temperature, condenser tube fouling, condenser shell air binding, or reduction of service water flow.

8. **START** the chiller by performing one of the following:

   a. At AEP-1, **PLACE** Water Chiller Compressor WC-2 A-SA (WC-2 B-SB) control switch to the START position and release. _____

   OR

   b. **DEPRESS** the START push-button at the local control panel with the Local Select switch in the LOCAL position. _____

NOTE: Engineering recommends running ESW for about 5-10 minutes after the chiller starts to ensure it reaches steady state operation. Operator judgment should be used to determine if continuing to run the ESW pump to prevent the High Condenser Pressure alarm is warranted. There is no operability impact, but a nuisance alarm can be prevented.

9. IF desired,
   THEN **STOP** the ESW Pump started in Step 5.1.1.7. _____

5.2. Placing Standby Train In Operation

NOTE: It is necessary to shift associated trains of HVAC units when shifting trains of Essential Services Chilled Water.

NOTE: This Section is written for swapping from Train B ESCW to Train A ESCW, with components for swapping from Train A ESCW to Train B ESCW in parentheses.

5.2.1. Initial Conditions

1. Service water is being supplied to the non-operating chiller WC-2 1A-SA (WC-2 1B-SB). _____

2. One train of ESCW is already in operation. _____

3. For non-emergency starts the prestart checks of Attachment 5 have been performed and an operator should be present to observe start of chiller. _____

4. Section 8.12, Manual Chiller Reset performed if necessary for non-operating chiller. _____

5. The L.O. heaters have been in service for twelve hours. (See Precaution and Limitation 4.0.3 for applicability of this Initial Condition) _____

NOTE: If service water header temperature is greater than 85°F and the ESW pump is available startup of ESW is required. The pump should run for approximately 30 minutes before chiller start. ESW provides additional flow at typically lower temperatures when used for service water supply. Starting ESW prior to a chiller start minimizes condenser pressure. Historically, High Condenser Pressure alarms have been received during summer months due to high service water temperatures and high chilled water loads.

6. IF desired due to Service Water temperatures being high, THEN VERIFY a same train ESW Pump is running. Pump should run for approximately 30 minutes before chiller start. _____

5.2.2. Procedural Steps

NOTE:	The local alarm indication for low chilled water flow and low chilled water temperature will lock in until manually reset at the WC-2 control panel.
NOTE:	If starting the chiller compressor is delayed following the start of the P-4 Pump in the next Step, the compressor oil could cool down to the point that the compressor will trip on low oil pressure.
NOTE:	Step 5.2.2.7 can be performed anytime after Step 5.2.2.1. It is preferable to start the fans before the chiller in Winter months. This allows the chill water to heat up and prevents the chiller cycling on and off on low temperature.

1. At AEP-1, **START** the non-operating Chiller WC-2 A-SA (B-SB) Chilled Water Pump P-4 A-SA (B-SB) to establish chilled water flow in the non-operating train. _____

2. At the Local Control panel, **RESET** the Low Chilled Water Flow alarm using the CHILLED WATER NO FLOW TRIP INDICATION RESET push-button. _____

3. **IF** starting the chiller for the first time following maintenance where the chiller lube oil heater circuit was under clearance,
THEN PERFORM the following:

   a. Locally **START** the oil pump on the standby chiller compressor by taking the control switch on the local panel to the MAN position. _____

   b. **RUN** pump for 5 minutes. _____

   c. **STOP** the standby chiller compressor oil pump by taking the control switch on the local panel to the AUTO position. _____

4. At the Local Control Panel, CHECK that all alarm lights are **NOT** lit. _____

5. **IF** any alarm light(s) is lit,
THEN PERFORM the following:

   a. **IF** the Local Select switch is in the LOCAL position,
   THEN locally **DEPRESS** the STOP push-button. _____

   b. **IF** the Local Select switch is in the MCB HVAC position,
   THEN place the standby chiller compressor control switch on AEP-1 to STOP. _____

5.2.2 Procedural Steps (continued)

c. IF any alarm light is still lit,
THEN PERFORM the following:

(1) DECLARE the chiller inoperable. _____

(2) INITIATE corrective actions. _____

NOTE: OPT-1512 rotates the Temperature Control Point potentiometer to clean the surfaces. While OPT-1512 restores the potentiometer to its original position, it is possible that due to the surface cleaning the characteristics of the potentiometer have changed sufficiently to require a manual temperature adjustmen: per Section 8.14 of this procedure. This will be determined by monitoring temperature after chiller start in the following Step.

NOTE: ALB-023/1-14 (2-14), WC-2 CH 1A (1B) CNDSR REFRIG HI PRESS, may alarm during startup of the Chillers. High chiller condenser pressure is caused by inadequate cooling of the refrigerant. Causal factors for high condenser pressure include high chiller service water inlet temperature, condenser tube fouling, condenser shell air binding, or reduction of service water flow.

6. START the chiller by performing ONE of the following:

a. At AEP-1, PLACE Water Chiller Compressor WC-2 A-SA (WC-2 B-SB) control switch to the START position AND RELEASE. _____

OR

b. DEPRESS the START push-button at the local control panel with the local select switch in the LOCAL position. _____

7. START Train A (B) ESF Equipment Cooling System per OP-172, Section 5.6. _____

5.2.2 Procedural Steps (continued)

NOTE: ESR 99-00142 has evaluated and determined that long-term closure of the supply and return valves to the NNS AH units will not affect operability of the Essential Services Chiller system. The next two Steps will align the NNS AH units however, if it is desired to maintain the NNS isolation valves shut, then steps 5.2.2.8 and 5.2.2.9 may be skipped.

8. ISOLATE the supply and return valves to the NNS AH units from the train that was already operating by shutting the following valves:

1CH-196 SB (1CH-125 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL	_____
1CH-197 SA (1CH-126 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL	_____
1CH-148 SB (1CH-115 SA)	CHILLED WATER TO NESSR FANS CLR ISOL	_____
1CH-149 SA (1CH-116 SB)	CHILLED WATER TO NESSR FAN CLRS ISOL	_____

9. ALIGN NNS AH units to the train that will remain operating by opening the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	_____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	_____

10. IF shifting chillers to support placing the standby safety equipment train in service,
THEN PERFORM Attachment 8. _____

5.2.2 Procedural Steps (continued)

NOTE: Service water to the chiller condenser will isolate 90 seconds after the chiller has stopped, SW FROM WC-2 B-SB (A-SA) CONDENSER 1SW-1208 SB (1SW-1055 SA) will close.

NOTE: ALB-23/1-15 and ALB-23/1-16 (ALB-23/2-15 and ALB-23/2-16) are expected alarms when securing A (B) Chiller.

CAUTION

Failure of equipment to secure in the following step will result in the associated EDG being inoperable. Tech Spec 3.8.1.1 is applicable until the breaker for the affected load is opened.

11. **STOP** the chiller by performing one of the following:

    a. At AEP-1, **PLACE** Water Chiller Compressor WC-2 B-SB (A-SA) control switch to the STOP position and release. _____

    OR

    b. **DEPRESS** the STOP push-button at the local control panel with the local select switch in the LOCAL position. _____

12. At AEP-1, **STOP** the Chiller WC-2 B-SB (A-SA) Chilled Water Pump P-4 B-SB (A-SA) in the train just secured. _____

NOTE: Engineering recommends running ESW for about 5-10 minutes after the chiller starts to ensure it reaches steady state operation. Operator judgment should be used to determine if continuing to run the ESW pump to prevent the High Condenser Pressure alarm is warranted. There is no operability impact, but a nuisance alarm can be prevented.

13. **IF** desired,
    THEN STOP the ESW Pump started in Step 5.2.1.6. _____

14. **NOTIFY** the following to update the protected train placards:

    - Security _____
    - WCC _____
    - Maintenance Shop _____
    - Operations (Update the Protected Train placard in the Operations Turnover area) _____

5.6. ESF Equipment Cooling System Startup

5.6.1. Initial Conditions

1. Attachments 1 and 2 have been completed. _____

2. Essential Services Chilled Water is lined up per OP-148. _____

5.6.2. Procedural Steps

NOTE: If the power to the following Air Handling Units is available and the area temperature is above the setpoint, then the fan will start.

1. IF A Train is being started,
THEN PLACE the following Air Handling Units control switches to START AND VERIFY proper damper and valve operation (if they start):

- MCC A35 FAN COOLER AH-92 A SA _____
- CCW PUMP AREA FAN COOLER AH-7 A SA _____
- CCW PUMP AREA FAN COOLER AH-6 A SA _____
- CSIP SAB AREA FAN COOLER AH-10 A SA (if aligned as A) _____
- CSIP SA AREA FAN COOLER AH-9 A SA _____
- AFWP & HVAC CHILLER FAN COOLER AH-20 A SA _____
- AFWP & HVAC CHILLER FAN COOLER AH-19 A SA _____
- 216' RAB MECH PENET AREA FAN COOLER AH-28 A SA _____
- ELEC PENET AREA SA AREA FAN COOLER AH-24 X-SA
AH-24 RTN CH 422, SLB-11/1-3 _____
- RHT AREA FAN COOLER AH-23 X-SA
AH-23 RTN CH 409, SLB-11/1-2 _____
- CSP & RHR PUMPS A SA FAN COOLER AH-5 A-SA _____
- MECH PENET AREA FAN COOLER AH-11 A-SA
AH-11 RTN CH 485, SLB-11/1-1 _____

5.6.2 Procedural Steps (continued)

- EQUIPMENT ROOM 2 FAN COOLER AH-26 A-SA
  AH-26 RTN CH 434, SLB-11/1-4 _____
- CRD ROD CONTROL CABINET FAN COOLER AH-93 X-SA _____

2. IF B Train is being started,
   THEN PLACE the following Air Handling Units control switches to START AND VERIFY proper damper and valve operation (if they start):
   - MCC B35 FAN COOLER AH-92 B SB _____
   - CCW PUMP AREA FAN COOLER AH-7 B SB _____
   - CCW PUMP AREA FAN COOLER AH-6 B SB _____
   - CSIP SAB AREA FAN COOLER AH-10 B SB (if aligned as B) _____
   - CSIP SB AREA FAN COOLER AH-9 B SB _____
   - AFWP & HVAC CHILLER FAN COOLER AH-20 B SB _____
   - AFWP & HVAC CHILLER FAN COOLER AH-19 B SB _____
   - BIT AREA FAN COOLER AH-28 B-SB _____
   - ELEC PENET AREA SB AREA FAN COOLER AH-25 X-SB
     AH-25 RTN CH 793, SLB-9/1-3 _____
   - EVAP ISLE WPB MCC & INST RACK FAN COOLER AH-29 X-SB
     AH-29 RTN CH 833, SLB-9/2-1 _____
   - SW BSTR FAN COOLER AH-8 X-SB
     AH-8 RTN CH 603, SLB-9/1-1 _____
   - CSP & RHR PUMPS B SB FAN COOLER AH-5 B-SB _____
   - MECH PENET AREA FAN COOLER AH-11 B-SB
     AH-11 RTN CH 643, SLB-9/1-2 _____
   - EQUIPMENT ROOM 1 FAN COOLER AH-26 B-SB
     AH-26 RTN CH 807, SLB-9/1-4 _____
3. IF this is for initial system startup,
   THEN Locally PLACE S-68 1X-SA Control Switch in AUTO. _____

Rev. 1

Revised per NRC comments provided on 75 day outline submittal.

Archie Lucky 6/22/2013

Rev. 2

Revised per Operations validation comments.

JR Horton 7/03/2013

Appendix D	Scenario Outline	Form ES-D-1

HARRIS 2013 NRC SCENARIO 5

Facility: SHEARON-HARRIS Scenario No.: 5 Op Test No.: 05000400/2013301

Examiners: _____ Operators: SRO: _____

_____ RO: _____

_____ BOP: _____

Initial Conditions: IC-27, MOL, ~3% power

- Plant startup to full power on HOLD until 'B' Condensate Booster Pump is in service
- 'B' Condenser Vacuum Pump is under clearance for makeup water supply valve problems
- 1SI-3, Boron Injection Tank Outlet valve is under clearance for breaker repairs
- Boric Acid Transfer Pump B-SB is under clearance for motor replacement
- GP-005, Power Operation, step 95.c

Turnover:
- Power ascension is on hold for 'B' Condensate Booster pump oil system repairs. Repairs are now completed and the pump is ready for service.
- Start the Second 'B' Condensate Booster Pump IAW OP-134 Section 5.6.

Critical Tasks:
- Establish SI flow of >200 gpm using alternate high head safety injection to cold legs prior to securing RCPs
- With RCS pressure < 1400 psig, and SI flow of >200 gpm, RCP Trip Foldout Criteria, once is met and prior to exiting E-0

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP/SRO	Start the 'B' Condensate Booster Pump
2	tt:144 jtb143b	I – RO/SRO	Letdown Temperature Controller fails LD/Diversion Valve fails to bypass demineralizers
3	lt:486	C – BOP/SRO TS - SRO	Controlling 'B' Steam Generator Level Transmitter, LT-486, fails low
4	JFB7579 Z2715TIC	C-BOP/SRO	AH-39 Containment Fan Coil Unit fan trip with back up auto start failure ('C' RCP cooling fan)
5	ccw08a	C – RO/SRO	Component Cooling Water system leak requiring AOP-014 entry and manual makeup to maintain level
6	lt:990	TS – SRO	Failure of RWST level channel I, LI-990 fails high
7	rcs09a	C – RO/SRO	RCP "A" rising vibration requires manual Reactor trip and securing "A" RCP and associated PRZ spray valve after E-0 immediate actions are completed
8	rcs18a	M – ALL	SBLOCA inside containment (100% severity)
9	sis017 sis018	C – RO/SRO	Failure of BIT outlet valve 1SI-4 to open requiring alternate high head injection flow path use
10	N/A	C – RO/SRO	Manually trip "B" and "C" RCP when RCP trip criteria are met IAW E-0 foldout
11	zrpk504a zrpk504b	C – BOP/SRO	Failure of automatic Main Steam Line Isolation to occur when Containment pressure exceeds 3 psig

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

7/8/13

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5

Low power scenario – Turnover to crew is the unit startup on hold. The plant is in Mode 2 with Reactor power less than 5%. Power ascension was on hold for 'B' Condensate Booster pump oil system leak repairs. The repairs and PMT have been completed and the pump is ready to be returned to service. When the crew takes the shift the expectation is to start the 'B' Condensate Booster pump IAW OP-134, Condensate System, Section 5.6. After the pump is running they will continue with GP-005, Power Operation, to obtain rated power conditions.

The following equipment is under clearance:

- 'B' Condenser Vacuum Pump is under clearance for makeup water supply valve problems. Has been under clearance for 8 hours. Repairs are expected to be completed within 24 hours.
- 1SI-3, Boron Injection Tank Outlet valve is under clearance for breaker repairs. The valve is shut with power removed. The valve has been under clearance for 4 hours. OWP-SI-01 has been completed. Repairs are expected to be completed within 24 hours. Tech Specs 3.5.2 and 3.6.3 apply.

EMERGENCY CORE COOLING SYSTEMS

3/4.5.2 ECCS SUBSYSTEMS - T_{avg} GREATER THAN OR EQUAL TO 350°F

LIMITING CONDITION FOR OPERATION

3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE Charging/safety injection pump.

b. One OPERABLE RHR heat exchanger.

c. One OPERABLE RHR pump, and

d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and, upon being manually aligned, transferring suction to the containment sump during the recirculation phase of operation.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours

- 1SI-3, Boron Injection Tank Outlet valve, Tech Specs...continued

3/4.6.3 CONTAINMENT ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.3 Each containment isolation valve specified in the Technical Specification Equipment List Program, plant procedure PLP-106, shall be OPERABLE with isolation times less than or equal to required isolation times.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more of the containment isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and:

a. Restore the inoperable valve(s) to OPERABLE status within 4 hours, or

b. Isolate each affected peretration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position, or

- Boric Acid Transfer Pump B-SB is under clearance for motor replacement. Has been under clearance for 12 hours. Repairs are expected to be completed within 24 hours. Tech Spec 3.3.3.3.5.b which is a 7 day LCO and 3.1.2.2 applies (3.1.2.2 is for tracking only). OWP-CS-05 has been completed.

REMOTE SHUTDOWN SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.3.5.a The Remote Shutdown System monitoring instrumentation channels shown in Table 3.3-9 shall be OPERABLE.

3.3.3.5.b All transfer switches, Auxiliary Control Panel Controls and Auxiliary Transfer Panel Controls for the OPERABILITY of those components required by the SHNPP Safe Shutdown Analysis to (1) remove decay heat via auxiliary feedwater flow and steam generator power-operated relief valve flow from steam generators A and B, (2) control RCS inventory through the normal charging flow path, (3) control RCS pressure, (4) control reactivity, and (5) remove decay heat via the RHR system shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With the number of OPERABLE remote shutdown monitoring channels less than the Minimum Channels OPERABLE as required by Table 3.3-9, restore the inoperable channel(s) to OPERABLE status within 7 days, or be in HOT SHUTDOWN within the next 12 hours.

b. With the number of OPERABLE remote shutdown monitoring channels less than the Total Number of Channels required by Table 3.3-9, restore the inoperable channels to OPERABLE status within 60 days or submit a Special Report in accordance with Specification 6.9.2 within 14 additional days.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5 continued

Event 1: Start the 'B' Condensate Booster Pump. Upon turnover and assuming the shift the crew will start the 'B' Condensate Booster pump IAW OP-134, Condensate System, Section 5.6 "Second Condensate Booster Pump Start up". After the pump is in operation the crew will discuss raising power IAW GP-005 to prepare to place the Main Feedwater Regulating valves in service. Prior to the power increase event 2 will occur.

Event 2: Letdown Temperature Controller fails LD/Diversion Valve fails to bypass demineralizers. This failure will cause temperature controller TK-144 output to decrease to zero. Without cooling to the letdown heat exchanger, temperatures observed on TI-143 will increase. At 135°F annunciator ALB-07-3-2, Demin Flow Diversion High Temp will alarm. The crew should respond IAW the alarm procedure. The RO should identify that the divert valve to the VCT has failed to respond. The RO should report the failure to the SRO. The SRO should direct manually bypassing the CVCS Demineralizers, and should also provide directions to the RO to restore letdown temperature to normal utilizing MANUAL control of TK-144. The SRO should provide a temperature band to the RO IAW OMM-001, Conduct of Operations, for operation of components in manual. The SRO can find this temperature band guidance in OP-107. With TK-144 controller not in auto the temperature band should be from 110 – 120°F. The CVCS Demineralizers should remain bypassed pending an evaluation for continued resin use. Soon after stabilizing from this temperature controller failure event 3 will occur. The SRO will complete OMM-001 Attachment 5 and request assistance from the WCC center.

Event 3: Controlling 'B' Steam Generator Level Transmitter, LT-486, fails low. The BOP should respond to multiple 'B' Steam Generator alarms on ALB-014 and take manual control of the 'B' FRV Bypass valve in accordance with the alarm response procedures and OMM-001, Conduct of Operations. The SRO will have the crew implement OWP-RP-06, complete OMM-001 Attachment 5 and request assistance from the WCC center. The SRO should evaluate the following Tech Specs for failure of LT-486:

T.S. 3.3.1: As a minimum, the Reactor Trip System instrumentation channels and interlocks of Table 3.3-1 shall be OPERABLE

REACTOR TRIP SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
13. Steam Generator Water Level--Low-Low	3/stm. gen.	2/stm. gen. in any operating stm. gen.	2/stm. gen. each operating stm. gen.	1, 2	6(1)
14. Steam Generator Water Level--Low Coincident With Steam/ Feedwater Flow Mismatch	2 stm. gen. level and 2 stm./feed-water flow mismatch in each stm. gen.	1 stm. gen. level coincident with 1 stm./feedwater flow mismatch in same stm. gen.	1 stm. gen. level and 2 stm./feed-water flow mismatch in same stm. gen. or 2 stm. gen. level and 1 stm./feedwater flow mismatch in same stm. gen.	1, 2	6

(1)The applicable MODES for these channels noted in Table 3.3-3 are more restrictive and, therefore, applicable.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5 continued

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.

T.S. 3.3.2: The Engineered Safety Features Actuation System (ESFAS) instrumentation channels and interlocks shown in Table 3.3-3 shall be OPERABLE with their Trip Setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3-4.

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
5. Turbine Trip and Feedwater Isolation					
b. Steam Generator Water Level--High-High (P-14)	4/stm. gen.	2/stm. gen. in any stm. gen.	3/stm. gen. in each stm. gen.	1, 2	19
6. Auxiliary Feedwater					
c. Steam Generator Water Level--Low-Low					
1) Start Motor-Driven Pumps	3/stm. gen.	2/stm. gen. in any stm. gen.	2/stm. gen. in each stm. gen.	1, 2, 3	19
2) Start Turbine-Driven Pump	3/stm. gen.	2/stm. gen. in any 2 stm. gen.	2/stm. gen. in each stm. gen.	1, 2, 3	19

ACTION STATEMENTS (Continued)

ACTION 19 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.2.1.

The OWP is not required to be implemented in order to continue with the scenario. If the crew allows SG levels to decrease to < 30% they will be required to perform a manual Reactor Trip.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5 (continued)

Event 4: Trip of AH-39 Containment Fan Coil Unit fan with back up auto start failure. The failure will cause annunciator ALB-029 4-5 "Containment Fan Coolers AH-39 Low Flow-O/L to alarm. The crew should identify that the standby fan did not auto start and start the standby fan. The SRO will complete OMM-001 Attachment 5 and request assistance from the WCC center.

Event 5: Component Cooling Water system leak requiring AOP-014 entry and manual makeup to maintain level. A CCW leak in the running pump suction header will develop. The leak will be within CCW Surge Tank makeup capability. The crew should identify the leak by observation of MCB indications for CCW Surge Tank level or MCB annunciators based on CCW Surge Tank low level. The crew should respond to the CCW Surge Tank level change and/or alarm and enter AOP-014, LOSS OF COMPONENT COOLING WATER. The RAB RO will be dispatched to investigate the leak. The crew will maintain CCW Surge Tank level in the normal operating range by opening the demin water make up valve 1DW-15, on the MCB. Shortly after being dispatched the leak will be identified as a leak in the suction header near the pump. The leak can be manually isolated by closing local isolation valves. The crew will then be required to start the standby 'B' CCW pump and secure the running 'A' CCW pump IAW OP-145. The SRO will complete OMM-001 Attachment 5 and request assistance from the WCC center. The SRO should evaluate TS 3.7.3.

PLANT SYSTEMS

3/4.7.3 COMPONENT COOLING WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.3 At least two component cooling water (CCW) pumps*, heat exchangers and essential flow paths shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one component cooling water flow path OPERABLE, restore at least two flow paths to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

*The breaker for CCW pump 1C-SAB shall not be racked into either power source (SA or SB) unless the breaker from the applicable CCW pump (1A-SA or 1B-SB) is racked out.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5 (continued)

Event 6: Failure of RWST level channel I, LI-990 fails high. RWST level instrument LI-990 will fail high (100%) which will cause annunciator ALB-04-2-1, Refueling Water Storage Tank High Level to alarm. The RO will respond by reviewing the alarm response in the APP.
(NOTE: The RO will not receive credit a competency for an instrument failure since there are not any evaluative actions taken).

The SRO will direct the crew to implement OWP-ESF-05. The SRO will complete OMM-001 Attachment 5 and request assistance from the WCC center. Then evaluate Tech Spec 3.3.2 and 3.3.3.6

Tech Spec 3.3.2

INSTRUMENTATION

3/4.3.2 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.2 The Engineered Safety Features Actuation System (ESFAS) instrumentation channels and interlocks shown in Table 3.3-3 shall be OPERABLE with their Trip Setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3-4.

APPLICABILITY: As shown in Table 3.3-3.

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
7. Safety Injection Switchover to Containment Sump					
a. Automatic Actuation Logic and Actuation Relays	2	1	2	1, 2, 3, 4	14
b. RWST Level--Low-Low	4	2	3	1, 2, 3, 4	16
Coincident With Safety Injection	See Item 1. above for all Safety Injection initiating functions and requirements.				

ACTION 16 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the inoperable channel is placed in the bypassed condition within 6 hours and the Minimum Channels OPERABLE requirement is met. One additional channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5 (continued)

Event 6: Failure of RWST level channel I, LI-990 fails high. (Tech Spec evaluation continued)

Tech Spec 3.3.3.6 Action a (RWST Level LI-990 is an accident monitoring instrument based on OST-1021 Attachment 6 – Post Accident Monitoring Instrumentation Log, Item # 9)

INSTRUMENTATION

ACCIDENT MONITORING INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.6 The accident monitoring instrumentation channels shown in Table 3.3-10 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With the number of OPERABLE accident monitoring instrumentation channels, except In Core Thermocouples and Reactor Vessel Level, less than the Total Required Number of Channels requirements shown in Table 3.3-10 restore the inoperable channel(s) to OPERABLE status within 7 days, or be in at least HOT STANDBY within the next 6 hours and in at least HOT SHUTDOWN within the following 6 hours.

TABLE 3.3-10

ACCIDENT MONITORING INSTRUMENTATION

INSTRUMENT	TOTAL REQUIRED NO. OF CHANNELS	MINIMUM CHANNELS OPERABLE
1. Containment Pressure		
a. Narrow Range	2	1
b. Wide Range	2	1
2. Reactor Coolant Hot-Leg Temperature--Wide Range	2	1
3. Reactor Coolant Cold-Leg Temperature--Wide Range	2	1
4. Reactor Coolant Pressure--Wide Range	2	1
5. Pressurizer Water Level	2	1
6. Steam Line Pressure	2/steam generator	1/steam generator
7. Steam Generator Water Level--Narrow Range	N.A.	1/steam generator
8. Steam Generator Water Level--Wide Range	N.A.	1/steam generator
9. Refueling Water Storage Tank Water Level	2	1

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5 (continued)

Event 7: RCP "A" rising vibration requires manual Reactor trip and securing "A" RCP and associated PRZ spray valve after E-0 immediate actions are completed. During this event the 'A' RCP vibrations will begin to increase and over 3 minutes peak at 28 mils shaft. Note: the shaft vibration instrumentation reads up to 30 mils. The crew will respond to the 'A' RCP malfunction by either identifying rising vibrations or when ALB-010-1-5, RCP-A Trouble alarms. The crew should see the 'A' RCP vibration probe readings are increasing. The crew should enter AOP-018, Reactor Coolant Pump Abnormal Conditions and perform the immediate actions of checking any CSIP running (YES). Vibrations will continue to increase and exceed AOP-018 Attachment 1 RCP trip criteria of 20 mils shaft. Since the RCP is NOT operating within the trip limits and the Reactor is NOT tripped, the crew will have to Trip the Reactor, GO TO EOP-E-0, perform the immediate actions of E-0 and return to AOP-018 follow up actions of steps 5-8 when time permits. The SRO should address steps 5-8, stopping the affected RCP and shutting the associated PZR spray valve prior to the manual Reactor trip.

> **Note**: AOP-018 recent revisions now direct Tripping the Reactor prior to tripping a running RCP. ALL RCP's must be operating whenever the Reactor trip breakers are closed. Previously two loop power operation was allowed after securing one RCP if the initial power level was $\leq$49%.

The crew will then transition from EOP E-0 to ES-0.1, Reactor Trip Response. The Lead Examiner can allow the crew to stabilize the plant then insert the major event.

Event 8: **Major** – SBLOCA inside containment (100% severity). The major event is a SBLOCA (100% severity) on 'A' Loop. The crew should recognize a rapid decrease in Pressurizer level and RCS pressure. If the crew responds quickly to the event they may manually actuate a Safety Injection based on ES-0.1 foldout criteria of not being able to maintain Pressurizer level > 5% or RCS subcooling < 10°F. If they do not respond quickly an Automatic Safety Injection will occur. The crew will then transition from ES-0.1 back to E-0, Reactor Trip or Safety Injection. They will again carry out immediate actions of E-0.

Event 9: Failure of BIT outlet valve 1SI-4 to open requiring alternate high head injection flow path use. 1SI-4 will fail to automatically open with the Safety Injection signal and cannot be manually opened from the MCB switch. Additionally, 1SI-3 was under clearance and cannot be opened from the MCB due to control power being removed from the breaker. In order to obtain Safety Injection flow the crew will have to use the alternate high head injection flow path as directed by E-0 RNO actions. They should OPEN alternate high head Safety Injection to cold legs valve 1SI-52 SA and then identify Safety Injection flow exceeding 200 gpm.

Event 10: Manually trip 'B' and 'C' RCP when RCP trip criteria are met IAW E-0 foldout. Shortly after entering E-0, the crew should recognize that the RCS pressure is low enough to meet Foldout Criteria for securing all RCPs but there is no flow indicated on FI-943 (normal SI flow indication). The crew will have to establish SI flow by opening the alternate high head Safety Injection to cold legs valve 1SI-52 SA. After opening 1SI-52A adequate flow (> 200 gpm) will be indicated on FI-940 (alternate SI flow indication) to STOP the 'B' and 'C' RCP's.

SCENARIO SUMMARY: 2013 NRC EXAM SCENARIO 5 (continued)

Event 11: Failure of automatic Main Steam Line Isolation to occur when Containment pressure exceeds 3 psig. As the Small Break LOCA continues to flow RCS to the Containment the pressure in the Containment will continue to rise. An automatic Main Steam Isolation signal is generated when Containment pressure is $\geq$ 3.0 psig. The crew will have shut the MSIV's due to the cooldown encountered from securing the 'A' RCP but the MSIV before seat drain valves (1MS-231, 1MS-266, 1MS-301) will remain OPEN. The MCB switch for manual actuation of MSLI will NOT function therefore each drain valve will have to be manually shut from the individual MCB switches.

The crew will transition from E-0, Reactor Trip or Safety Injection at step 30 when Containment pressure is checked and found to be NOT normal to E-1, Loss of Reactor or Secondary Coolant step 1. The crew will progress through E-1 based on crew performance they will reach a decision point at step 13.

They will transition from in E-1 to ES-1.2, Post LOCA Cooldown and Depressurization, based on RCS pressure > 230 psig and RHR HX header flow < 1000 gpm.

While in ES-1.2 based on RCS cooldown rate exceeding 100°F/HR they will have to wait prior to reducing RCS temperature further.

The scenario ends when the crew has determined that the 100°F/HR cooldown rate has been exceed.

CRITICAL TASK JUSTIFICATION:

1. Establish SI flow of >200 gpm using alternate high head safety injection to cold legs prior to securing RCPs

   Failure of the crew to manually align Safety Injection flow through the alternate high head injection flow path results in a degradation of the capacity of the ECCS systems. The only available makeup water source during this event is the high pressure safety injection from the CSIPs. Until the alternate high head safety injection flow is aligned the safety margin of the plant is significantly reduced and may result in irreparable damage to the reactor core.

2. With RCS pressure < 1400 psig, and SI flow of >200 gpm, RCP Trip Foldout Criteria, once is met and prior to exiting E-0

   Securing RCPs during a SB LOCA event will prevent depleting the RCS to a critical inventory by pumping more mass through the break than would occur if the RCP operation were ceased. (Critical inventory is defined as the amount of inventory remaining in the RCS when the break completely uncovers and the break flow changes from a mixture of liquid and steam to all steam.) The LOCA event in this scenario is a SB LOCA that requires the RCPs to be secured when E-0 foldout conditions are met. IF the crew continues to allow the RCPs to operate due to lack of establishment of SI flow of > 200 gpm then RCS inventory will continue to deplete. Manually tripping the RCPs before depletion below the critical inventory conservatively ensures that Peak Clad Temperature remains below 2200°F.

SIMULATOR SETUP

For the 2013 NRC Exam Simulator Scenario # 5

Reset to IC-165 password "dinner"

Go to RUN

Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner.

Set ERFIS screens

(The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

SPECIAL INSTRUCTIONS

Scenario will have ONLY the "A" Condensate/Condensate Booster Pump running. Turnover information for starting the "B" Condensate/Condensate Booster pump: will be that the Condensate Booster Pump "B" Lock-Out Relays are reset. The crew will need to start the "B" pump PRIOR to exceeding 5% Reactor Power. OP-134 Section 5.6.1 Initial condition #3 requires Rx Power to be >5% and should be N/A'd for this start.

Post conditions for status board from IC-165
Mode 2 <5% Reactor power Startup on HOLD due to 'B' C/CB pump. Last shift repaired an oil leak and 'B' C/CB pump is now ready to be started. After pump is verified running w/o leakage continue preparations to Mode 1.

Provide a marked up copy of GP-005 Rev 70 through Step 95.b
Control Bank D at 96 steps
RCS boron 1600 ppm
BA pot set to 5.26
RCS press 2220 - 2250 all PZR heaters ON
SG level maintained with "A" MFW pump and FW Reg Bypass Vlvs in Auto
RCS temp 558.8°F, stable on Steam Dumps
RCS temp band from step 52 is 555°F - 561°F
Main Turbine at 1800 rpm
Hang CIT on 'B' Condenser Vacuum Pump
Hang CIT on 1SI-3, Boron Injection Tank Outlet valve
Place completed copy of OWP-SI-01 in OWP book
Hang CIT on Boric Acid Transfer Pump B-SB
Hang restricted access signs on all 3 Simulator entry swing gates
Hang STAR placard on Rod Control In/Out Switch
Hang STAR placard on Steam Dump controller M/A station
Set CRT screen 3 to "QP POAH"

Update the status board:
1SI-3 Tech Spec 3.4.2 – 72 hour LCO, OOS for 2 hours
BA Transfer pump 'B' Tech Spec 3.3.3.5.b – 7 day LCO, OOS for 1 hour.

Op Test No.: NRC	Scenario # 5	Event # 1	Page 13 of 78
Event Description:	**Start "B" Condensate Booster Pump**		

Time	Position	Applicant's Actions or Behavior
Lead Evaluator:		**When the crew has completed their board walk down and are ready to take the shift inform the Simulator Operator to place the Simulator in Run. When the Simulator is in run announce:** **CREW UPDATE – (SRO's Name) Your crew has the shift. END OF UPDATE**
Simulator Operator:		**When directed by the Lead Evaluator, ensure that the annunciator horns are on and place the Simulator in RUN.**
Lead Evaluator:		**After the crew has taken the shift the BOP will place "B" Condensate Booster Pump in service.**
Evaluator Note:		**Before inserting the first failure wait for the "B" Condensate Booster Pump alignment to be completed AND the BOP to return to the at the controls area.**
	SRO	Directs BOP to start the "B" Condensate Booster pump in accordance with OP-134 section 5.6
	BOP	Performs OP-134 Reviews Section 5.6, Starting Second Condensate / Condensate Booster Pump • Contacts Turbine Building AO to observe start
Simulator Communicator:		**I printed out a copy of OP-134 Section 5.6 and have the procedure in hand.**
	BOP	Informs AO that they are about to start "B" Condensate Booster Pump and • Makes PA announcement prior to starting pump

Op Test No.: NRC	Scenario # 5	Event # 1	Page 14 of 78
Event Description:	**Start "B" Condensate Booster Pump**		

Time	Position	Applicant's Actions or Behavior
OP-134		Condensate System, Section 5.6, Second Condensate Booster Pump Start Up
	BOP	Step 1: PERFORM prestart checks on Condensate Booster Pump B(A) per Attachment 6. Contacts Aux Operator to perform prestart checks per Attachment 6
Simulator Communicator:		**I walked down the 'B' Condensate Booster Pump and completed the prestart checks. The pump is ready to be started.**
	BOP	Step 2: VERIFY CONDENSATE BOOSTER PUMP B ~~(A)~~ RECIRC, 1CE-261 ~~(1CE-220)~~ in MODU and shut. • Checks 1CE-261 in MODU and shut. (YES)
Procedure Caution:		There are no Condensate Booster Pump trips to protect the pump from running without seal water.
	BOP	Step 3: PLACE PK-2308 ~~(PK-2307)~~ CNDST BSTR PUMP B ~~(A)~~ SPEED CONTROLLER to MAN and zero the demand signal. • Checks PK-2308 in MAN with zero demand signal
	BOP	Step 4: VERIFY OPEN 1CE-268 (~~1CE-227~~), CONDENSATE BOOSTER PUMP B ~~(A)~~ DISCHARGE. • OPENS 1CE-268
Procedure Note:		• Computer points listed in Section 6.0 of this procedure may be monitored for information. • When the Condensate Booster Pump control switch is placed to the START position, the Aux Lube Oil Pump will start and supply the VSF Coupling with oil until oil pressure is greater than or equal to 10 psig as indicated on PI-01LO-2304B(A), at which time the Condensate Booster Pump starts.

Op Test No.: NRC	Scenario # 5	Event # 1	Page 15 of 78
Event Description:	**Start "B" Condensate Booster Pump**		

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		The amount of time the associated recirc valve, 1CE-261 (1CE-220) is open, should be minimized due to lack of lubrication without Condensate Booster Pump running.
	BOP	PLACE the control switch CONDENSATE BOOSTER PUMP B ~~(A)~~ RECIRC, 1CE-261 (~~1CE-220~~) in the OPEN position immediately prior to starting Condensate Booster Pump B ~~(A)~~. • Places control switch for 'B' Condensate Booster Pump recirc valve 1CE-261 to OPEN
Procedure Note:		Starting the second Condensate Booster Pump may cause the previously running pump controller to reject to Manual. This is due to the speed sensor on the pump being started initially providing a speed input signal that is based on electrical noise. If the running CBP controller rejects to manual, it is permissible to return the controller to Auto once the CBP being started reaches the no-load speed. If the controller again rejects to manual, then further investigation would be required.
	BOP	Step 6: START B (A) Condensate Booster Pump. • Places 'B' Condensate Booster Pump start switch to START • Verifies indications that the pump has started and running as expected • Checks / Monitors Normal Operating parameters per section 6.0
Simulator Communicator:		**Report that the 'B' Condensate Booster pump has a good start**
		Step 7: Locally VERIFY Condensate Booster Pump B (A) Aux Lube Oil Pump has stopped. • Contacts Aux Operator to verify Aux Lube Oil Pump has stopped
Simulator Communicator:		**'B' Condensate Booster Pump Aux Lube Oil Pump has STOPPED**

Op Test No.: NRC	Scenario # 5	Event # 1	Page 16 of 78
Event Description:	**Start "B" Condensate Booster Pump**		

Time	Position	Applicant's Actions or Behavior
	BOP	Step 8: CHECK differential pressure across the Pall Replaceable Duplex Filter, as indicated between PI-01LO-2304B1 and PI-01LO-2304B2 (~~PI-01LO-2304A1 and PI-01LO-2304A2~~) is less than 15 PSI (less than 9 PSI when oil temperature has warmed up to normal). • Contacts Aux Operator to check differential pressure across the filter
Simulator Communicator:		**The differential pressure across the Duplex Filter, as indicated between PI-01LO-2304B1 and PI-01LO-2304B2 is less than 11 PSI. I will continue to monitor as the oil warms up to ensure that when the oil temperature is at the normal temperature the differential pressure is < 9 psig.**
	BOP	Step 9: N/A Step 10: SLOWLY INCREASE the demand signal on PK-2308 (~~PK-2307~~) CNDST BSTR PUMP B (~~A~~) SPEED CONTROLLER to match the demand signal on the previously running Condensate Booster Pump Speed Controller. • Slowly increases demand signal on PK-2308 and matches the demand signal on the 'A' Condensate Booster Pump Speed Controller.
	BOP	Step 11: WHEN the demand signals are matched, THEN PLACE PK-2308 (~~PK-2307~~) CNDST BSTR PUMP B (~~A~~) SPEED CONTROLLER to AUTO. • Verifies demand signals are matched and places PK-2308 in AUTO
	BOP	Step 12: PLACE the control switch for CONDENSATE BOOSTER PUMP B (~~A~~) RECIRC, 1CE-261 (~~1CE-220~~) in the MODU position. • Places control switch for 'B' Condesate Booster Pump recirc valve 1CE-261 to MODU position.

Op Test No.: NRC Scenario # 5 Event # 1 Page 17 of 78		
Event Description:	**Start "B" Condensate Booster Pump**	
Time	Position	Applicant's Actions or Behavior
	BOP	Step 13: After 5 to 10 minutes of running, VERIFY the VSF coupling oil level is in the normal operating range. • Contacts Aux Operator to verify the VSF coupling oil level is in the normal operating range after 5 to 10 minutes from when the pump was started.
Simulator Communicator:		**Acknowledge request to verify the VSF coupling oil level is normal in 5 to 10 more minutes.** **I will call you back if there is something abnormal.**
End of OP-134 'B' Condensate Booster Pump Start		
Evaluator Cue:		**When the BOP has completed starting the 'B' Condensate Booster pump, returns to the MCB at the controls area, informs the CRS that the 'B' Condensate Booster Pump is running, continue with the scenario.** **Cue Simulator Operator to insert Trigger 2:** **Event 2 - Letdown Temperature Controller fails LD/Diversion Valve fails to bypass demineralizers.**

Op Test No.: NRC	Scenario # 5	Event # 2	Page 18 of 78
Event Description:	**Letdown Temperature Control Failure**		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 2:** **Letdown Temperature Controller fails with LD/Diversion Valve fail to bypass demineralizers.**
Indications Available:		• ALB-007-3-2, DEMIN FLOW DIVERSION HIGH TEMP • ALB-007-5-5, COMPUTER ALARM CHEM & VOL SYSTEMS • TK-144 output - decreases to 0 • TI-144.1 HX Out Temp – decreases to 0 • TI-143 temperature increasing
Evaluator Note:		**If the crew catches this failure early and temperature does not increase above 135°F then they may NOT identify that 1CS-50 is failed since there well be no reason for the valve to change position.** **Changes in Letdown temperature can have an affect on the demineralizers resins. During high input temperature a boron release can occur (effects similar to a boration) and during low input temperatures a boron absorption can occur (effects similar to a dilution).**
	RO	Responds to alarm and enters APP-ALB-007-3-2.
	RO	• CONFIRM alarm using: o TI-143, LP Letdown Temperature. o Reports TI-143 reading or trending high. • VERIFY Automatic Functions: o Manually positions 1CS-50, Letdown to VCT/Demin, to divert flow to the VCT.

Op Test No.: NRC	Scenario # 5	Event # 2	Page 19 of 78
Event Description:	**Letdown Temperature Control Failure**		

Time	Position	Applicant's Actions or Behavior
	RO	• PERFORM Corrective actions: o VERIFY that 1CS-50 diverts flow to the VCT, bypassing the BTRS and Purification Demineralizers. o PERFORM the following as needed to lower letdown temperature: ▪ VERIFY proper charging flow is established. (YES) ▪ LOWER letdown flow. (N/A – CCW Problem) o IF CCW flow to the Letdown Heat Exchanger appears low, THEN: ▪ TAKE manual control of TK-144. ▪ OPEN 1CC-337, to raise CCW flow.
	SRO	• Provide a temperature band IAW OMM-001 for operation of components in manual. OP-107 page 31 with TK-144 controller in auto directions is to maintain temperature from 110 – 120°F. **(NOTE this is not the only procedure that provides temperature guidance)** • The CVCS Demineralizers will remain bypassed pending an evaluation. • Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist • Contacts Work Control and/or System Engineer for assistance.
Simulator Communicator:		**If contacted as WCC, System Engineer or Chemistry: *"Maintain flow bypassing the demineralizers until a resin damage assessment is completed".***
Evaluator Cue:		**After crew has restored CCW flow to the Letdown Heat Exchanger, cue Simulator Operator to insert Trigger3.** **Event 3 - Controlling 'B' Steam Generator Level Transmitter, LT-486, fails low**

Op Test No.: NRC	Scenario # 5	Event # 3	Page 20 of 78
Event Description:	SG "B" Controlling Level Channel Failure (Low)		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from Lead Evaluator actuate Trigger 3: SG "B" Controlling Level Channel Failure (Low)**
Indications Available:		• **ALB-014-2-1B SG B NR LEVEL/ SP HI / LO DEV** • **ALB-014-5-4B SG B LOW LOW LEVEL**
	RO	RESPONDS to multiple 'B' SG alarms
Evaluator Note:		**The APP-ALB-014-2-1B and 14-5-4B actions are similar. IAW OPS-NGGC-1000, the operator may take MANUAL control of a malfunctioning controller before being directed by a procedure or the SRO.**
	BOP	• CONFIRM alarm using: o LI-484 SA, LI-485 SB, or LI-486 SA, Steam Generator B level indicators. o Reports LI-486 reading or failed low. • VERIFY Automatic Functions: NONE • PERFORM Corrective Actions: o CHECK Steam Flow (FI-484, FI-485) AND Feed Flow (FI 486, 487) for deviation. (YES) o IF FCV-489, SG B Bypass valve auto level controller, is NOT sufficiently correcting level, THEN: (YES) ▪ SWITCH to MANUAL. ▪ RESTORE level to normal (57% NR).
	SRO	• Provides level band and trip guidance for "B" SG level while in manual control IAW OMM-001, Attachment 13 o SG Level – Control Band 52% to 62% o Trip limit Low 30% - Trip limit High 73% • Refer to OWP-RP-06 to remove channel from service.

Op Test No.: NRC	Scenario # 5	Event # 3	Page 21 of 78
Event Description:	SG "B" Controlling Level Channel Failure (Low)		

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**OWP-RP-06 has been included on page 64 of this scenario guide.** **Implementation of the OWP or removal of the failed channel from service does not have to be completed to continue with the scenario.**
	SRO	Enters Instrumentation TS 3.3.1 Functional Unit 13 ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied: a. The inoperable channel is placed in the tripped condition within 6 hours, and b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1 3.3.2 Functional Unit 5.b, 6.c Action 19 With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied : a. The inoperable channel is placed in the tripped condition within 6 hours, and b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up t o 4 hours for surveillance testing of other channels per Specification 4.3.2.1.

Op Test No.: NRC	Scenario # 5	Event # 3	Page 22 of 78
Event Description:	SG "B" Controlling Level Channel Failure (Low)		

Time	Position	Applicant's Actions or Behavior
	SRO	• Requests extra operator for dedicated feedwater operation • Direct operator and I&C to perform OWP-RP-06 • Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist. • Contacts WCC for assistance / generation of EIR and Work Request • Contacts support personnel for repairs.
Simulator Communicator:		**Acknowledge request and reports from SRO.** **IF an extra operator is requested, state that no one is available right now and someone will be sent when available.** **IF asked to report to MCR to perform OWP-RP-06 state that you will report as soon as possible.**
Evaluator Note:		**It is not required to implement the OWP prior to continuing with the scenario.**
Evaluator Cue:		**After Tech Spec evaluation is performed, cue the Simulator Operator to insert Trigger 4.** **Event 4 – Trip of AH-39 – (Note: there is a 18 second delay from the initiation of the trigger to actuation of fan trip and alarm)**

Op Test No.: NRC Scenario # 5 Event # 4 Page 23 of 78		
Event Description:	**AH-39 Containment Fan Coil Unit fan trip With back up auto start failure ('C' RCP cooling fan)**	
Time	Position	Applicant's Actions or Behavior

Simulator Operator:	**On cue from the Lead Evaluator actuate Trigger 4:** **AH-39 Containment Fan Coil Unit Fan trip** **(Note: there is a 18 second delay from the initiation of the trigger to actuation of fan trip and alarm)**

Indications Available		• ALB-029-4-5 CONTAINMENT FAN COOLERS AH-39 LOW FLOW - O/L • Increasing 'C' RCP stator winding temperatures
	BOP	RESPONDS to alarms and ENTERS APP-ALB-029-4-5
	BOP	• CONFIRM alarm using: o AH-39 fans running indication (NO) o Damper position indication (YES) • VERIFY Automatic Functions: o Running fan trips (YES) o Backup fan starts (NO) (BOP starts the standby fan when directed by SRO, may utilize OP-169 section 5.2 or the APP for guidance) • PERFORM Corrective Actions: o CHECK standby fan STARTS AND lead fan STOPS. o DISPATCH an operator to check status of the following breakers: ▪ 1D1-1A, AH-39 (1A-NNS) CNMT Fan Cooler ▪ 1E1-7C, AH-39 (1B-NNS) CNMT Fan Cooler
	SRO	Directs BOP to start standby Air Handler (this may take place prior to getting the report of the breaker condition)

Op Test No.: NRC	Scenario # 5	Event # 4	Page 24 of 78
Event Description:	**AH-39 Containment Fan Coil Unit fan trip With back up auto start failure ('C' RCP cooling fan)**		

Time	Position	Applicant's Actions or Behavior
Simulator Communicator:		**After approximately 1 minute from being dispatched to check the breaker for 1D1-1A, AH-39 (1A-NNS) CNMT Fan cooler breaker, report that:** ***"The indications on the Static Trip Unit show that an Overload Condition occurred for AH-39 A fan. There are no abnormalities on the AH-39B breaker."***
	BOP	○ IF any breaker has tripped on OVERLOAD or SHORT CIRCUIT as indicated on the Static Trip Unit, THEN PERFORM the following: **(Directs AO to perform based on report from communicator)** ▪ DEPRESS the breaker Alarm Reset. ▪ RACK OUT the breaker using OP-156.02, AC Electrical Distribution. ▪ VERIFY cause of the over current trip is determined prior to returning the breaker to service.
Simulator Communicator:		**Acknowledge request to perform directed actions at 1D1-1A**
Simulator Operator:		**Rack out breaker 1D1-1A for AH-39 and clear alarm** • **Activate Trg 15** **Trigger 15 will clear the alarm then 30 seconds later it will override the switch to STOP and turn off the RED and GREEN MCB switch lights.** **Have communicator report back 30 seconds after running the trigger.**
	RO	Monitors RCP "C" parameters on ERFIS and or OSI PI

Op Test No.: NRC Scenario # 5 Event # 4 Page 25 of 78		
Event Description:	**AH-39 Containment Fan Coil Unit fan trip With back up auto start failure ('C' RCP cooling fan)**	
Time	Position	Applicant's Actions or Behavior
	SRO	Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist for the failure of AH-39. Contacts WCC and EM's for assistance with repairs.
Evaluator Cue:		**When breaker racking is completed, cue Simulator Operator to insert Trigger 5** **(Note: After the trigger is inserted it will take ~ 2 minutes for the CCW alarm to occurs)** **Event 5 – Component Cooling Water system leak**

Op Test No.: NRC	Scenario # 5	Event # 5	Page 26 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 5:** **Component Cooling Water system leak** **(Note: After the trigger is inserted it will take ~ 2 minutes for the CCW alarm to occurs)**
Indications Available		• ALB-005-8-5, COMPUTER ALARM CCW SYSTEM
Evaluator Note:		**The crew may enter AOP-014, LOSS OF COMPONENT COOLING WATER, when the first alarm is confirmed.**
	RO	RESPONDS to alarm ALB-005-8-5, COMPUTER ALARM CCW SYSTEM.
	BOP	REPORTS CCW Surge Tank level alarm on alarm screen.
APP ALP-05-6-1		Actions from the APP are below but crew will most likely perform a direct entry into AOP-014. Go to page 28 if AOP-014 is entered
Procedure Note:		The CCW Surge Tank baffle plate separates Side A and Side B up to the 38% level.
	RO	CONFIRM alarm using: • LI-670A.1, CCW Surge Tank Level (Side A) • LI-676A.1, CCW Surge Tank Level (Side B)

Op Test No.: NRC	Scenario # 5	Event # 5	Page 27 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY Automatic Functions: • CCW flow to the GFFD and Primary Sample Panel will isolate on a low CCW Surge Tank level (40%). **(Level should remain > 40%)** • CCW Holdup Tank Transfer Pump and the CCW Drain Tank Transfer Pump will trip on a high CCW Surge Tank level (75%). (N/A)
	RO	PERFORM Corrective Actions: • IF surge tank level is high AND rising. (N/A) • IF radiation activity level is increasing, THEN GO TO AOP-016, Excessive Primary Plant Leakage. (NO) • IF the alarm is due to plant heatup, THEN DRAIN the surge tank to normal level. (NO) • IF surge tank level is low, THEN GO TO AOP-014, Loss of Component Cooling Water. (YES)

Op Test No.: NRC	Scenario # 5	Event # 5	Page 28 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
	SRO	ENTERS and directs actions of AOP-014, LOSS OF COMPONENT COOLING WATER. Makes PA announcement for AOP entry Holds a crew alignment brief
AOP-014		Loss Of Component Cooling Water
Procedure Note:		• This procedure contains no immediate actions. • Loss of CCW may require implementation of the SHNPP Emergency Plan.
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Matrix .
	SRO	EVALUATE plant conditions AND GO TO the appropriate section: **Malfunction** / **Section** / **Page** Leakage into CCW System / 3.1 / 5 Leakage from CCW System / 3.2 / 15 Loss of a CCW Pump / 3.3 / 34 • Determines section 3.2 is appropriate
	SRO	CONTACTS AO to check RAB for CCW leaks. (This action is not procedurally directed but should happen during the course of implementing this AOP.)
Simulator Communicator:		**Acknowledge request.** **Wait 1 minute then report a leak in the suction header between 1CC-27 and CCW Pump "A".**

Op Test No.: NRC	Scenario # 5	Event # 5	Page 29 of 78
Event Description:	Component Cooling Water system leak		

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**The crew should begin to trace out where the leakage is and what to do to isolate the leakage using the MCR Simplified Flow Diagrams (SFDs). They should identify that closing 1CC-27 and 1CC-36 will isolate the leak. They will also see that isolating the leak will require them to secure the 'A' CCW pump and start the standby pump.**
	Crew	Identifies leak location on SFDs and determines method to isolate the leakage • Shut 1CC-27 • Shut 1CC-36 • Secure 'A' CCW pump and start 'B' CCW pump
Simulator Communicator:		**After you are directed to close 1CC-27 and 1CC-36, wait one minute then have Simulator Operator delete MF CCW08A - then report the valves closed.**
Simulator Communicator:		**If a report is requested:** **RadWaste reports increased RAB floor drain in-leakage.**
Evaluator's Note:		• **CCW Pump start/stop actions are provided in the Scenario Guide.** • **The path through the procedure may be different for each crew since it depends on when the leak location is known and how certain questions are answered. However, each crew should initiate makeup, swap running pumps, isolate the leak, and address the Tech Spec.**
Procedure Note:		The GFFD and RCS sample panel will isolate on low CCW Surge Tank level of less than or equal to 40%.
	RO	MAINTAIN CCW Surge Tank level between 45% and 75% using 1DW-15, CCW Make Up.

Op Test No.: NRC	Scenario # 5	Event # 5	Page 30 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		An affected CCW Pump is one to which any of the following apply: • Less than 4% level indicated on the CCW Surge Tank • Exhibits abnormal flow • IF non-essential header isolation valves are open, less than 4% level indicated on either CCW Surge Tank affects both CCW Pumps.
	RO	CHECK BOTH of the following conditions exist: • ALL CCW Surge Tank level indicators are greater than 4% (YES) • CCW Pump flow indication is NORMAL (YES)
	SRO	CHECK EITHER RHR Train in Shutdown Cooling Mode. (NO)
	RO/SRO	CHECK RCS temperature greater than 200°F. (YES)
	RO	CHECK CCW Surge tank level is > 40% (YES)
	RO/SRO	CHECK that CCW loads from the Non-Essential header require isolation by ANY of the following: (NO)
	RO/SRO	CHECK CCW lost to ANY operating RHR Train: (NO)
Evaluator Note:		**The steps highlighted below may not be performed IF the crew starts the 2nd CCW pump and has isolated the leak before reaching these steps.**
Procedure Caution:		Operation of RCPs for greater than 10 minutes without CCW cooling to the motor oil coolers may result in RCP bearing damage.
	SRO	CHECK CCW expected to be lost for greater than 10 minutes. (NO)

Op Test No.: NRC	Scenario # 5	Event # 5	Page 31 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		Reactor Makeup Water Tank contains potentially tritiated water. Making up to the CCW System from the Reactor Makeup Water Tank could result in CCW System contamination. Operation of the system while it is contaminated requires an evaluation per 10CFR50.59.
	RO	CHECK CCW Surge Tank level STABLE OR RISING. (YES)
Procedure Note:		• If the leak location is known, non-applicable steps (Steps 15 through 21) are not required to be performed. • If the leak location is not known, the CRS may direct performance of Steps 15 through 21 in any order. Steps 22 and 23 directing diagnostic and walkdown may be useful in determining leak location and may be performed prior to or in parallel with Steps 15 through 21. • Elevated leakage may be indicated by higher indicated levels, higher level controller setpoints, annunciators, evolutions in progress, notification by personnel, Chemistry sample results or other means. • RCDT in-leakage is indicated by elevated level controller output.
	SRO	From the note above since the leak location is known from the Aux Operator report steps 15 – 21 are NOT required to be performed.
	SRO	PERFORM a walkdown of CCW piping looking for leaks. • Walkdown was performed and leak location identified and isolated

Op Test No.: NRC	Scenario # 5	Event # 5	Page 32 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		Leakage in excess of 15.8 gph per train (unanticipated makeup greater than twice per shift) could exceed surge tank makeup capacity under design basis conditions.
		WHEN the leak is LOCATED, THEN PERFORM the following: • CHECK that CCW System leakage can be isolated. (YES) • INITIATE corrective actions to restore system to service. • DIRECT Chemistry to sample CCW for proper corrosion inhibitor concentration. – Contacts Chemistry
Simulator Communicator:		**Acknowledge request for CCW sample**
	SRO	RESTORE CCW flow to the following, as needed: • Sample Heat Exchangers • GFFD • Excess Letdown • RCDT Heat Exchangers
	SRO	The SRO will complete OMM-001 Attachment 5 and request assistance from the WCC center to repair system leakage. The SRO should evaluate TS 3.7.3 TS 3.7.3 Action: With only 1 CCW pump flow path OPERABLE, restore at least two flow paths to OPERABLE status within 72 hours or be in at least HSB within the next 6 hours and in CSD within the following 30 hours.
	SRO	DOCUMENT component manipulations per OPS-NGGC-1308, Plant Status Control.

Op Test No.: NRC	Scenario # 5	Event # 5	Page 33 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
	SRO	DIRECTS RO to start the 'B' CCW pump and stop the 'A' CCW Pump per OP-145.
Simulator Operator:		**If requested to remove control power from "A" CCW Pump: Remote Function CCW075 CP_OFF**
OP-145		Component Cooling Water
	RO	VERIFIES Initial Conditions and contacts Aux Operator to perform pre-start checks on the 'B' CCW pump
Simulator Communicator:		**When contacted by RO – 'B' CCW pump checks are completed and the pump is ready to be started.**
Procedure Note:		NOTE: Starting the second pump could cause ΔP fluctuations across REM-01CC-3501ASA (BSB) which may shut solenoid valves 1CC-23 and 1CC-40. NOTE: Starting the second pump may cause flow oscillations which could shut 1CC-252. Re-opening of 1CC-252 should not be attempted until the second pump is secured. NOTE: APP-ALB-005 Windows 1-3, 2-1, and 3-2 are expected alarms when starting the second CCW Pump.
Procedure Caution:		With one CCW pump running and the standby pump capable of an automatic start, ensure a minimum flow rate of 7850 gpm exists as indicated on FI-652.1 (FI-653.1). If both CCW pumps are running OR the CCW trains are separated, a minimum of 3850 gpm per pump is required. This lower flowrate should only be allowed for short durations to accomplish pump swapping or system realignment.
	RO	Makes PA announcement that 'B' CCW pump is about to be started. Stand clear of the pump and breaker. Step 1: At the MCB, START CCW Pump Train B-SB. • Locates MCB start switch for "B' CCW pump and starts pump • Verifies that indications are normal for the started pump.

Op Test No.: NRC	Scenario # 5	Event # 5	Page 34 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
Simulator Communicator:		**Inform RO that 'B' CCW pump has a good start.**
	RO	Step 2: VERIFY flow is greater than or equal to 3850 gpm on FI-653.1 and FI-652.1.
	RO	Step 3: VERIFY OPEN, 1CC-23 and 1CC-40, REM 3501 A CCW Inlet Solenoid Valve and REM 3501 B CCW Inlet Solenoid Valve respectively. • Contacts Aux Operator to verify
Simulator Communicator:		**Acknowledge request and report back in 1 minute** **1CC-23 and 1CC-40, REM 3501 A CCW Inlet Solenoid Valve and REM 3501 B CCW Inlet Solenoid Valves are OPEN**
	RO	PERFORM one of the following: • SECURE a second CCW Pump using Section 7.1.
OP-145		Component Cooling Water Section 7.1
	RO	VERIFIES Initial Conditions.
Procedure Note:		The following Steps are written assuming shutdown of Train B-SB CCW pump. If shutting down Train A-SA CCW pump, use components in parenthesis.

Op Test No.: NRC	Scenario # 5	Event # 5	Page 35 of 78
Event Description:	**Component Cooling Water system leak**		

Time	Position	Applicant's Actions or Behavior
	RO	Step 1: VERIFY OPEN, the following valves: • 1CC-99, CCW HEAT EXCHANGER A TO NONESSENTIAL SUP (YES) • 1CC-113, CCW HEAT EXCHANGER B TO NONESSENTIAL SUP (YES) • 1CC-127, CCW NONESSENTIAL RETURN TO HEADER B (YES) • 1CC-128, CCW NONESSENTIAL RETURN TO HEADER A (YES)
	RO	Step 2: VERIFY SHUT, 1CC-147 and 1CC-167, CCW FROM RHR HEAT EXCHANGER B-SB AND A-SA (YES)
Procedure Note:		If pressure falls below 52 psig, the CCW pump will restart.
Procedure Caution:		Failure of equipment to secure in the following step will result in the associated EDG being inoperable. Tech Spec 3.8.1.1 is applicable until the breaker for the affected load is opened.
	RO	Step 3: At the MCB, PLACE the control switch for CCW Pump Train A-SA to STOP AND HOLD until system pressure stabilizes above 52 psig. • Stops 'A' CCW pump (may have been completed previously)
	RO	Step 4: VERIFY the following for Train A: • FLOW stops using FI-653.1 (FI-652.1) • PRESSURE remains greater than 75 psig suing PI-650 (PI-649).
	RO	Step 5: CHECK Train B flow rate between 10,000 and 11,000 gpm on MCB indicator FI-663.1. (YES)
Evaluator's Note:		**When the leak is isolated, the 'B' CCW Pump has been started, and the TS declaration is complete, cue Event 6 Failure of RWST level channel I, LI-990 fails high.**

Op Test No.: NRC	Scenario # 5	Event # 6	Page 36 of 78
Event Description:	**Failure of RWST level channel I, LI-990 fails high**		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 6: Failure of RWST level channel I, LI-990 fails high**
Indications Available		• ALB-04-2-1, Refueling Water Storange Tank High Level • LI-990 reads 100%
	RO	Responds to annunciator Identifies LI-990 failed high – reports information to SRO Reviews the APP response Directs SRO to OWP-ESF and provides list of possible applicable Tech Specs from APP response
	SRO	Directs the crew to implement OWP-ESF-05 Complete OMM-001 Attachment 5 and requests assistance from the WCC center Evaluates Tech Specs for the failed channel • Tech Spec 3.3.2 Requires ESF Actuation system instrumentation channels to be OPERABLE Action 16 would apply ACTION 16 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the inoperable channel is placed in the bypassed condition within 6 hours and the Minimum Channels OPERABLE requirement is met. One additional channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1. • Tech Spec 3.3.3.6 Action a (RWST Level LI-990 is an accident monitoring instrument based on OST-1021 Attachment 6 – Post Accident Monitoring Instrumentation Log, Item # 9) Action a applies: ACTION: a. With the number of OPERABLE accident monitoring instrumentation channels, except In Core Thermocouples and Reactor Vessel Level, less than the Total Required Number of Channels requirements shown in Table 3.3-10 restore the inoperable channel(s) to OPERABLE status within 7 days, or be in at least HOT STANDBY within the next 6 hours and in at least HOT SHUTDOWN within the following 6 hours.
Simulator Communicator:		**Acknowledge any requests for assistance including implementation of the OWP.**

Op Test No.: NRC	Scenario # 5	Event # 6	Page 37 of 78
Event Description:	**Failure of RWST level channel I, LI-990 fails high**		
Time	Position	Applicant's Actions or Behavior	

Evaluator Note:		**Implementation of the OWP does not have to be completed to continue with the scenario.**
Evaluator Note:		**When the Tech Spec evaluation is complete continue scenario cue Event 7** **RCP "A" rising vibration requiring a manual Reactor trip**

Op Test No.: NRC	Scenario # 5	Event # 7	Page 38 of 78
Event Description:	"A" RCP High Vibrations		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator insert Trigger 7: "A" RCP high vibration**
Indications Available:		• **ALB-010-1-5, RCP-A TROUBLE** • **"A" RCP vibration monitors increasing and red high vibration lights lit**
	RO	Responds to alarm ALB-010-1-5.
Evaluator Note:		**Crew may review ALB-010-1-5 but will likely go directly to AOP-018 when high vibration is recognized.**
AOP-018	SRO	ENTERS and directs actions of AOP-018, Reactor Coolant Pump Abnormal Operations. Makes PA announcement for AOP entry Holds a crew alignment brief
	RO	Perform AOP-018 Immediate Action
Immediate Action		Check any CSIP running. (YES)
	SRO	Inform SM to refer to PEP-110 and enter the EAL Matrix.
	SRO	EVALUATE plant conditions AND GO TO the appropriate section: MALFUNCTION / SECTION / Page Loss of CCW and/or Normal Seal Injection to RCPs / 3.1 / 5 High Reactor Coolant Pump Vibration / 3.2 / 8 Reactor Coolant Pump Seal Malfunction / 3.3 / 10 Reactor Coolant Pump Motor Trouble / 3.4 / 18 Proceeds to Section 3.2, RCP High Vibration.

Op Test No.: NRC	Scenario # 5	Event # 7	Page 39 of 78
Event Description:	"A" RCP High Vibrations		

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**The answer to the following question may be YES at this time but the limit will be exceeded in short order. This is a continuous action step that should be implemented when the limit is exceeded. The scenario guide is therefore written as if the limit is exceeded when the step is read.**
	SRO/RO	Check all RCP's operating within limits of Att 1. (NO) ☐5. RCP vibration in excess of the following: [A.1] • 20 mils shaft • 15 mils shaft and increasing greater than 1 mil/hr • 5 mils frame • For A and C RCPs ONLY: 3 mils frame and increasing greater than 0.2 mil/hr • For B RCP ONLY: 3.5 mils frame and increasing greater than 0.2 mils/hr **When answer is YES follow below:**
	SRO	CHECK the Reactor is TRIPPED. (NO)
	SRO	TRIP the Reactor AND GO TO EOP-E-0. (Perform Steps 4 through 7 as time permits.) Directs RO to manually trip the Reactor.

Op Test No.: NRC	Scenario # 5	Event # 7	Page 40 of 78
Event Description:	**"A" RCP High Vibrations**		

Time	Position	Applicant's Actions or Behavior
E-0	SRO	Steps through immediate actions with crew Makes plant PA announcement Makes PA announcement for EOP entry Holds a crew alignment brief
Immediate Action	RO	Verifies Reactor is Tripped (YES) REACTOR TRIP CONFIRMATION Reactor Trip AND Bypass BKRs - OPEN Rod Bottom Lights (Zero Steps) - LIT Neutron Flux - DROPPING
Immediate Action	BOP	Verifies Turbine is Tripped – All throttle valves shut (YES) TURB STOP VLV 1 TSLB-2-11-1 TURB STOP VLV 2 TSLB-2-11-2 TURB STOP VLV 3 TSLB-2-11-3 TURB STOP VLV 4 TSLB-2-11-4
Immediate Action	BOP	Verify Power To AC Emergency Buses (YES) AC emergency buses – BOTH energized

Op Test No.: NRC	Scenario # 5	Event # 7	Page 41 of 78
Event Description:	**"A" RCP High Vibrations**		

Time	Position	Applicant's Actions or Behavior
Immediate Action	RO	Safety Injection Activated (NO) RNO action: Perform the following: a) Check Safety Injection – REQUIRED (NO) **SI ACTUATION CRITERIA** PRZ Pressure - LESS THAN OR EQUAL TO 1850 PSIG CNMT Pressure - GREATER THAN OR EQUAL TO 3.0 PSIG Any SG Pressure - LESS THAN OR EQUAL TO 601 PSIG Manual - DEGRADATION TOWARDS AUTOMATIC ACTUATION Abnormal Operating Procedure - DIRECTS MANUAL ACTUATION One SI Train - FAILED (BPLP 4-1 FLASHING) b) IF Safety Injection actuation is NOT required, THEN GO TO ES-0.1, "REACTOR TRIP RESPONSE", Step 1.
	SRO	Directs RO/BOP to secure the 'A' RCP and continue with AOP-018 steps 4-7
	RO/BOP	STOPS 'A' RCP and places PK-444C.1 to manual then shuts valve with demand at 0%
	SRO	Transitions to ES-0.1, "REACTOR TRIP RESPONSE", Step 1. Holds a crew alignment brief

Op Test No.: NRC	Scenario # 5	Event # 7	Page 42 of 78
Event Description:	**"A" RCP High Vibrations**		

Time	Position	Applicant's Actions or Behavior
EOP ES-0.1		Reactor Trip Response
Procedure Note:		Foldout applies
	SRO	Assigns foldout items of E-0 to both the RO and BOP • RO: o SI Actuation criteria • BOP o AFW supply switchover criteria
Evaluator Aide:		

FOLDOUT

- **SI ACTUATION CRITERIA**

  IF any of the following occurs, THEN actuate SI AND GO TO E.0, "REACTOR TRIP OR SAFETY INJECTION", Step 1:

  - RCS subcooling - LESS THAN 10° F - C
    20° F - M
  - PRZ level - CAN NOT BE MAINTAINED GREATER THAN 5%

- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

	SRO	Initiate Monitoring Of Critical Safety Function Status Trees.
	SRO	Evaluate EAL Matrix.

Op Test No.: NRC	Scenario # 5	Event # 7	Page 43 of 78
Event Description:	"A" RCP High Vibrations		

Time	Position	Applicant's Actions or Behavior
	SRO / BOP	Check RCS Temperature: a. Check RCPs - ANY RUNNING (YES – 'B' and 'C' b. Check SG blowdown isolation valves shut (NO) Shut SG blowdown FCVs: • 1BD-18 (FCV-8405A) (SHUTS) • 1BD-37 (FCV-8405B) (SHUTS) • 1BD-56 (FCV-8405C) (SHUTS)
Evaluator Note:		**Since the 'A' was secured RCS temperature will continue to drop. The crew will most likely shut the MSIV's here. After the MSIV's are shut RCS temperature will recover.**
	BOP	Stabilize AND Maintain Temperature Between 555°F AND 559°F using Table 1.

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DROPPING	GREATER THAN 557°F AND RISING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 210 KPPH until level greater than 25% at least one intact SG • IF cooldown continues, THEN, shut MSIVs AND BYPASS valves	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser - OR - • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F

		Informs CRS of cooldown then shuts ALL MSIV's
Evaluator Note:		**While the crew is stabilizing the plant after the MSIVs are shut and the crew sees that RCS temperature is stable or increasing then insert event 8** **Small Break LOCA inside Containment**

Op Test No.: NRC	Scenario # 5	Event # 8	Page 44 of 78
Event Description:	**Small Break LOCA**		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator insert Trigger 8: Small Break LOCA**
	RO / BOP	Identifies changing Primary plant conditions and recommends SI based on fold out criteria of ES-0.1 for rapidly decreasing Subcooling approaching the setpoint and Pressurizer level will not being able to be maintained > 5%
	SRO	Directs RO to actuate Safety Injection
	RO	Manually actuates Safety Injection
E-0	SRO	Re-enters E-0 - performs a crew alignment brief then has crew verify: • Reactor Trip (YES) • Turbine Trip (YES) • AC emergency buses energized (YES) • Safety Injection – Actuated (Both Trains) (YES) BPLP 4-1,"SI ACTUATED" - LIT (CONTINUOUSLY)
	SRO	Assigns foldout items of E-0 to both the RO and BOP • RO: o RCP Trip criteria o Alternate Miniflow Open/Shut criteria o RHR restart criteria • BOP o Ruptured SG AFW Isolation criteria o AFW supply switchover criteria

Op Test No.: NRC	Scenario # 5	Event # 8	Page 45 of 78
Event Description:	Small Break LOCA		

Time	Position	Applicant's Actions or Behavior

Evaluator Aide:

REACTOR TRIP OR SAFETY INJECTION

FOLDOUT

- **RCP TRIP CRITERIA**

  IF both of the following occur, THEN stop all RCPs.

  - SI flow - GREATER THAN 200 GPM
  - RCS pressure - LESS THAN 1400 PSIG

- **ALTERNATE MINIFLOW OPEN/SHUT CRITERIA**

  - IF RCS pressure drops to less than 1800 PSIG, THEN verify alternate miniflow isolation OR miniflow block valves - SHUT
  - IF RCS pressure rises to greater than 2200 PSIG, THEN verify alternate miniflow isolation AND miniflow block valves - OPEN

- **RHR RESTART CRITERIA**

  IF RCS pressure drops to less than 230 PSIG in an uncontrolled manner, THEN restart RHR pumps to supply water to the RCS.

- **RUPTURED SG AFW ISOLATION CRITERIA**

  IF all of the following occur to any SG, THEN stop feed flow by shutting the isolation valves (preferred) OR flow control valves to that SG:

  - Any SG level rises in uncontrolled manner OR has abnormal secondary radiation
  - Narrow range level - GREATER THAN 25% [40%]

- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

Op Test No.: NRC	Scenario # 5	Event # 8	Page 46 of 78
Event Description:	**Small Break LOCA**		

Time	Position	Applicant's Actions or Behavior
	CREW	Identifies Containment Adverse Conditions Containment Pressure > 3 psig
	SRO	Evaluate EAL Matrix.
	RO	Verifiy CSIPs – all running (YES) 'A' and 'B' running
	RO	Verify RHR Pumps – all running (YES) 'A' and 'B' running
	RO	Safety Injection flow > 200 gpm (NO)
	RO	Perform the following: a) Verify high head safety injection alignment: (1) CSIP suction from RWST valves - OPEN 1CS-291 (LCV-115B) (YES) 1CS-292 (LCV-115D) (YES) (2) VCT outlet valves - SHUT 1CS-165 (LCV-115C) (YES) 1CS-166 (LCV-115E) (YES) (3) Charging line isolation valves - SHUT 1CS-235 1CS-238 (4) BIT outlet valves - OPEN 1SI-3 (NO- under clearance) 1SI-4 (NO – unknown why) ATTEMPTS TO OPEN 1SI-4 (valve will NOT open) Informs SRO 1SI-4 will not OPEN
	SRO	Directs RO actions when high head safety injection flow path can NOT be aligned. Establish any other high head injection flow path (listed in order of preference): • Directs RO to OPEN 1SI-52 SA

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 47 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
Event 9 Critical Task #1	RO	Locates MCB control for 1SI-52 SA and takes switch to OPEN Informs SRO that 1SI-52 SA is OPEN Critical to establish SI flow of > 200 gpm using alternate high head safety injection to cold legs prior to securing RCPs Identifies that Safety Injection flow is now exceeding 200 gpm
Evaluators Note:		**RCS pressure may be < 1400 psig by this point in the scenario. It may not be yet depending on the crews progression through the scenario. When the crew identifies that SI flow is > 200 gpm and RCS pressure is < 1400 psig they will secure RCPs IAW E-0 RCP trip criteria.**
Event 10 Critical Task #2	RO	Identifies that RCP trip criteria is met based on RCS pressure < 1400 psig and SI flow > 200 gpm informs the SRO that RCP trip criteria is met and secures both **RCP 'B' and RCP 'C'** Critical to secure RCPs with RCS pressure < 1400 psig and SI flow > 200 gpm prior to exiting E-0
	SRO	RCS Pressure - LESS THAN 230 PSIG (NO)
Evaluator Note:		**The crew may have identified that Containment pressure was rising and established a Containment pressure setpoint < 3 psig and actuated MSLI earlier in the scenario.**

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 48 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	SRO	Main Steam Line Isolation – ACTUATED • NO – automatic MSLI is failed MAIN STEAM LINE ISOLATION ACTUATION CRITERIA CNMT pressure - GREATER THAN OR EQUAL TO 3.0 PSIG Any SG pressure - LESS THAN OR EQUAL TO 601 PSIG MANUAL - DEGRADATION TOWARDS AUTOMATIC ACTUATION Directs crew to actuate MSLI
Event 11	RO / BOP	Actuates MSLI Verifies MSIVs and Bypass Valves are SHUT The crew should identify that the MSIV before seat drain valves 1MS-231, 1MS-266 and 1MS-301 have failed to shut and SHUT each valve.
	BOP	Any SG pressure - 100 PSIG LOWER THAN PRESSURE IN TWO OTHER SGs (NO)
Evaluator Note:		**With Containment pressure approaching 10 psig the SRO may assign a pressure value to the RO to manually actuate Containment Spray prior to Auto actuation.** **When Containment Spray is actuated a Phase "B" actuation signal will also be generated. Depending on the crews pace through the procedures they may reach this point with RCPs still in operation and RCS pressure above the E-0 fold out criteria for tripping RCPs. IF the crew has not secured RCPs at this point they will now.**
	SRO	Directs RO to manually actuate Containment Spray at a Containment pressure below 10 psig to prevent auto Containment Spray actuation.

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 49 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	RO	Check CNMT Pressure - HAS REMAINED LESS THAN 10 PSIG (YES / NO – it will exceed 10 psig) • Verify CNMT spray – ACTUATED (YES) • Stop all RCPs o Locates MCB switches for RCP's and STOPS 'B' and 'C' RCP
	BOP	Verify AFW flow - AT LEAST 210 KPPH ESTABLISHED (YES)
	BOP	Sequencer Load Block 9 (Manual Loading Permissive) – ACTUATED (BOTH TRAINS) (YES)
	BOP	Energize AC buses 1A1 AND 1B1
Evaluator Note:		**E-0, Attachment 3 is located in the back of this guide.**
Evaluator Note:		**E-0 Attachment 3 is included in the back of this scenario.** **The RO will perform all board actions until the BOP completes Attachment 3. The BOP is permitted to properly align plant equipment IAW E-0 Attachment 3 without SRO approval.** **The Scenario Guide still identifies tasks by board position because the time frame for completion of Attachment 3 is not predictable.**
	BOP	Verify Alignment Of Components From Actuation Of ESFAS Signals Using Attachment 3, "Safeguards Actuation Verification", While Continuing With This Procedure.
	BOP	Directs AO to place 1A and 1B Air Compressor in the local control mode per E-0 Attachment 3 step 22

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 50 of 78
Event Description:	SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure		

Time	Position	Applicant's Actions or Behavior
Simulator Communicator		**Acknowledge the request to place 1A and 1B Air Compressor in the local control mode per E-0 Attachment 3 step 22**
Simulator Operator		**When directed to place the 1A and 1B Air Compressor in the local control mode:** **Run APP\air\acs_to_local**
Simulator Communicator		**When the APP for 1A and 1B Air Compressor has completed running call the MCR and inform them that the air compressors are running in local control.**
	BOP	Directs AO to locally unlock **AND** turn ON the breakers for the CSIP suction **AND** discharge cross-connect valves, referring to E-0, Attachment 3, step 23.
Communicator:		**Acknowledge request to unlock and turn on the breakers for the CSIP suction and discharge cross-connect valves** E-0, Attachment 3, step 23.
Simulator Operator:		**When requested to unlock and turn on CSIP suction and discharge cross-connect valves: Run APP\cvc\Path-1 Att. 6** **When the APP has completed running inform MCR that E-0, Attachment 3, step 23 is complete.**

MCC 1A35-SA		MCC 1B35-SB	
VALVE	CUBICLE	VALVE	CUBICLE
1CS-170	4A	1CS-171	4D
1CS-169	4B	1CS-168	7D
1CS-218	14D	1CS-220	9D
1CS-219	14E	1CS-217	12C

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 51 of 78
Event Description:	SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure		

Time	Position	Applicant's Actions or Behavior
Examiners Note:		**RCP's are secure therefore WR CL temperatures should be used when checking RCS temperature. RCS temp trend will be < 557° and dropping – control FF, maintain total FF > 210 KPPH until SG level > 40% (all MSIV's are shut)**
	RO	Stabilize AND Maintain Temperature Between 555°F AND 559°F Using Table 1.

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DROPPING	GREATER THAN 557°F AND RISING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 210 KPPH until level greater than 25% [40%] in at least one on intact SG • IF cooldown continues, THEN, shut MSIVs AND BYPASS valves	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser - OR - • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F

	RO	PRZ PORVs – SHUT (YES) PRZ Spray Valves – SHUT (YES - RCPs are secured) PRZ PORV Block Valves - AT LEAST ONE OPEN (YES)
	SRO	• Any SG pressure – DROPPING IN AN UNCONTROLLED MANNER OR COMPLETELY DEPRESSURIZED (NO) • Any SG - ABNORMAL RADIATION (NO) OR UNCONTROLLED LEVEL RISE (NO) • CNMT Pressure – NORMAL NO - GO TO E-1, "LOSS OF REACTOR OR SECONDARY COOLANT", Step 1.

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 52 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
E-1		Loss Of Reactor or Secondary Coolant
Procedure Note:		Foldout applies
	SRO	Performs alignment brief with crew Assigns foldout items of E-1 to crew (may assign both to the RO if the BOP is still performing Attachment 3) • RO: o RCP Trip criteria o RHR restart criteria o Alternate Miniflow Open/Shut criteria o Cold Leg Recirculation Switchover criteria • BOP o AFW supply switchover criteria o Secondary Integrity criteria o E-3 Transition criteria

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 53 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior

Evaluator Aide:	E-1 Foldout

FOLDOUT

- **RCP TRIP CRITERIA**

  IF both of the following occur, THEN stop all RCPs:

  - SI flow - GREATER THAN 200 GPM
  - RCS pressure - LESS THAN 1400 PSIG

- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- **RHR RESTART CRITERIA**

  IF RCS pressure drops to less than 230 PSIG in an uncontrolled manner, THEN restart RHR pumps to supply water to the RCS.

- **ALTERNATE MINIFLOW OPEN/SHUT CRITERIA**

  - IF RCS pressure drops to less than 1800 PSIG, THEN verify alternate miniflow isolation OR miniflow block valves - SHUT
  - IF RCS pressure rises to greater than 2200 PSIG, THEN verify alternate miniflow isolation AND miniflow block valves - OPEN

- **SECONDARY INTEGRITY CRITERIA**

  IF any of the following occurs, THEN GO TO E-2, "FAULTED STEAM GENERATOR ISOLATION", Step 1.

  - Any SG pressure - DROPS IN AN UNCONTROLLED MANNER AND THAT SG HAS NOT BEEN ISOLATED
  - Any SG - COMPLETELY DEPRESSURIZED AND THAT SG HAS NOT BEEN ISOLATED

- **E-3 TRANSITION CRITERIA**

  IF any SG level rises in an uncontrolled manner OR any SG has abnormal radiation levels, THEN GO TO E-3, "STEAM GENERATOR TUBE RUPTURE", Step 1.

- **COLD LEG RECIRCULATION SWITCHOVER CRITERIA**

  IF RWST level drops to less than 23.4% (2/4 Low-Low alarm), THEN GO TO ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.

	SRO	Initiate Monitoring Of Critical Safety Function Status Trees.
	RO	Maintain RCP Seal Injection Flow Between 8 GPM And 13 GPM.

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 54 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	BP	• Check Intact SG Levels: Any level - > 25% [40%] (YES / NO depends on monitoring and control – should be YES IF NO then Maintain total FF > 210 KKPH until level > 40% in at least 1 intact SG) • Control feed flow to maintain all intact levels between 25% And 50% [40% And 50%]. • Any level – Rising in an uncontrolled manner (NO)
	RO	Check PRZ PORV AND Block Valves: • Verify AC buses 1A1 AND 1B1 – ENERGIZED (YES) • Check PRZ PORVs – SHUT (YES) • Check block valves - AT LEAST ONE OPEN (YES) • IF a PRZ PORV opens on high pressure, THEN verify it shuts after pressure drops to less than opening setpoint.
	RO	Check SI Termination Criteria: RCS subcooling - > 10F [40F] - C 20F [50F] – M (NO)
	SRO	Check CNMT Spray Status: • Check any CNMT spray pump – RUNNING (NOT at this time but with increasing Containment pressure an automatic actuation will occur – The SRO should direct the crew to manually actuate Containment Spray at a conservative pressure below the automatic actuation setpoint of 10 psig) • Consult plant operations staff to determine if CNMT spray should be placed in standby.
Simulator Communicator		**IF contacted for CNMT spray pump evaluation tell CRS that at this time leave the CNMT spray pumps running.**

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 55 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	RO	Check Source Range Detector Status: Intermediate range flux - < 5x10-11 AMPS (YES) Verify source range detectors – ENERGIZED (YES) Transfer nuclear recorder to source range scale. (Transfers NR-45 to source range scale)
	RO	Check RHR Pump Status: Check RHR pump suction – ALIGNED TO RWST RWST Suction OPEN • RHR A: 1SI-322 (YES) • RHR B: 1SI-322 (YES) RCS Pressure - > 230 psig (YES) RCS pressure - STABLE OR RISING (YES) Stop RHR pumps – (STOPS BOTH RHR PUMPS)
	BOP / RO	Check RCS And SG Pressures: Check for both of the following: All SG pressures – Stable or Rising (YES) RCS pressure - Stable or Rising (YES)
	RO	Establish CCW Flow To The RHR Heat Exchangers: • Verify both CCW pumps – RUNNING (No only 'B' CCW) • Open 1CC-167 • Verify CCW flow to the RHR heat exchanger
	BOP	Check EDG Status: Check AC emergency buses 1A-SA AND 1B-SB – ENERGIZED BY OFFSITE POWER (YES) Check bus voltages Check breakers 105 and 125 CLOSED (YES) Check any EDG – RUNNING UNLOADED (YES)
	RO	Reset SI

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 56 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	BOP	Manually realign safeguards equipment following a loss of offsite power Shutdown any unloaded EDGs using OP-155 section 7
Simulator Communicator:		**Acknowledge the request, state that you are heading out to the EDGs and will call back when you are there.**
	SRO	Initiate Evaluation Of Plant Status: • RHR system - CAPABLE OF COLD LEG RECIRCULATION (YES) • Check auxiliary AND radwaste processing building radiation – NORMAL (YES) Check RCS Status: Check for both of the following: • RCS pressure – LESS THAN 230 PSIG (NO) • Any RHR HX header flow - GREATER THAN 1000 GPM (NO) GO TO ES-1.2, "POST LOCA COOLDOWN AND DEPRESSURIZATION", Step 1.

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 57 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
ES-1.2		POST LOCA COOLDOWN AND DEPRESSURIZATION
	SRO	Implements ES-1.2 Performs crew alignment brief
	RO	• Reset SI • Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. • Reset Phase A AND Phase B Isolation Signals. • Open Instrument Air AND Nitrogen To CNMT: o 1IA-819 o 1SI-287
	BOP	Monitor AC Buses: • Check AC emergency buses 1A-SA AND 1B-SB – ENERGIZED BY OFFSITE POWER (YES) • Check bus voltages • Check breakers 105 and 125 CLOSED (YES) • Check all non-emergency AC buses – ENERGIZED (YES)
Procedure Caution		PRZ heaters should **NOT** be energized until PRZ water level indicates greater than minimum recommended by plant operations staff to ensure heaters are covered.

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 58 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	RO	Secure PRZ Heaters: • Place backup heaters in the OFF position. • Verify control heaters – OFF (YES) • Consult Plant Ops Staff for recommended minimum PRZ water level to keep heaters covered Check RHR Pump Status: (OFF) • Aligned to RWST (YES) • RCS Pressure > 230 psig (YES) • RCS Pressure – stable or increasing (YES) • Check RHR pump suction aligned to RWST (YES) • Stop RHR pumps o Previously Stopped
Evaluator Note:		**At some point during the implementation of ES-1.2 the break will clear and the Safety Injection flow filling the RCS with cold RWST water will cause pressure and temperature reduction.** **Soon afterward the pressure will decrease to < 650 psig allowing the Safety Injection Accumulators to inject into the RCS. The injection will cause further temperature and pressure reductions. The critical safety function status tree for RCS integrity will begin to toggle from Green to Yellow to Orange to Red. Eventually RCS Integrity will remain RED and the crew will transition to FR-P.1**
	BOP	• Check Intact SG Levels: Any level - GREATER THAN 25% [40%] (YES) • Control feed flow to maintain all intact levels between 25% and 50% [40% and 50%].
Procedure Note:		After the low steam pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 59 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	RO	• Check PRZ Pressure: Pressure - LESS THAN 2000 PSIG (YES) o Block low steam pressure SI o Initiate RCS Cooldown To Cold Shutdown: Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR
EOP FR-P.1		Response to Imminent Pressurized Thermal Shock
	SRO	Implements FR-P.1 Performs crew alignment brief
	SRO	Foldout applies Assigns RO and BOP foldout actions • RO – None • BOP – AFW Supply Switchover criteria, Cold Leg Recirculation Switchover criteria
Evaluator Aide:		**FR-P.1 Foldout**

RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK

FOLDOUT

- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, THEN switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

- **COLD LEG RECIRCULATION SWITCHOVER CRITERIA**

  IF RWST level drops to less than 23.4% (2/4 Low-Low alarm), THEN GO TO ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 60 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	RO	Check RCS Pressure: Check for both of the following: • RCS pressure - LESS THAN 230 PSIG (NO / YES – it will be soon) • Any RHR HX header flow - > 1000 GPM (NO)
	RO	Check RCS Cold Leg Temperature Trend: • Check RCS Cold Leg Temperatures - STABLE OR RISING (NO)
Procedure Note:		A faulted SG is any SG that is depressurizing in an uncontrolled manner or is completely depressurized.
	BOP	Stop RCS Cooldown: Verify SG PORVs – SHUT (YES) Verify condenser steam dump valves – SHUT (YES) Check RHR system – IN SHUTDOWN COOLING MODE (NO) Any non-faulted SG level - > 25% [40%] (YES) Control feed flow to non-faulted SG(s) to stop RCS cooldown.
Procedure Caution:		IF the TDAFW pump is the only available source of feed flow, THEN maintain steam supply to the TDAFW pump from one SG.
	BOP	Minimize RCS Cooldown From Faulted SG(s): Check any SG – FAULTED (NO)
	RO	Check PRZ PORV Block Valves: • Verify power to block valves – AVAILABLE (YES) • Check block valves - AT LEAST ONE OPEN (YES)
Procedure Note:		IF PRZ PORV opens on high pressure, Step 6 should be repeated after pressure drops to less than PORV setpoint.
	RO	Check PRZ PORVs: Check all of the following: • Check LTOPS control switches - IN NORMAL (NOT BLOCKED) (NO – BLOCKED) • Check PRZ pressure - < 2335 psig (YES) • Verify PRZ PORVs – SHUT (YES)

Op Test No.: NRC	Scenario # 5	Event # 9, 10, 11	Page 61 of 78
Event Description:	**SI-4 failure, RCP 'B' and 'C' manual Trip, MSLI failure**		

Time	Position	Applicant's Actions or Behavior
	RO	Check SI Flow - > 200 gpm (YES)
	SRO	Check SI Termination Criteria: Check for both of the following: RCS subcooling - > 60°F [90°F] – C (NO)
Procedure Caution:		Following a complete loss of normal seal cooling, the affected RCP(s) should NOT be started prior to a status evaluation.
	SRO	Check If An RCP Should Be Started: RCS subcooling - GREATER THAN 10°F [40°F] – C (NO) Go to step 32
Procedure Caution:		Following an excessive cooldown, reactor vessel stress must be relieved to enhance and maintain vessel integrity. Do NOT perform any actions that raise pressure OR cause an RCS cooldown until the soak is complete.
Procedure Note:		Even if a soak period is required, steam may be released from intact SGs with pressure higher than the saturation pressure for lowest cold leg temperature.
		Determine RCS Soak Requirements: RCS cooldown rate - > 100°F in any 60 min period Perform one hour RCS soak: • Maintain RCS temperature stable. • Maintain RCS pressure stable. • Perform actions of other procedures that do NOT cause an RCS cooldown OR raise pressure.
Examiners Note:		END OF SCENARIO
Lead Evaluator		**Direct the Simulator Operator to place the Simulator to FREEZE** **Announce "CREW UPDATE" – The NRC has the shift. Inform the crew to remain seated at their desk and to not discuss the scenario.**
Simulator Operator		**When directed by the Lead Evaluator go to FREEZE**

Op Test No.: NRC	Scenario # 5	Event # 1	Page 62 of 78
Event Description:	OP-134 Section 5.6 – Second Condensate Booster Pump Start Up		
Time	Position	Applicant's Actions or Behavior	

5.6. Second Condensate Booster Pump Start Up

NOTE: Letters and/or numbers in the parenthesis are for Condensate Booster Pump A.

5.6.1. Initial Conditions

1. One Condensate Booster Pump is in service per Section 5.5. _____
2. Condensate Booster Pump B (A) Lock-Out Relay reset. _____

CAUTION

To prevent damaging the CBP recirc valves, do not operate the second Condensate Booster Pump for more than 1.5 hours with MFP suction flow less than 4500 kpph.

3. Reactor Power is greater than 5%. (This initial Condition is N/A for short term starts, such as swapping pumps) _____
4. CPD Operator and Chemistry have been notified of potential flow and pressure changes in the Condensate System. _____

5.6.2. Procedural Steps

1. PERFORM prestart checks on Condensate Booster Pump B(A) per Attachment 6. _____
2. VERIFY CONDENSATE BOOSTER PUMP B (A) RECIRC, 1CE-261 (1CE-220) in MODU and shut. _____

CAUTION

There are no Condensate Booster Pump trips to protect the pump from running without seal water.

3. PLACE PK-2308 (PK-2307) CNDST BSTR PUMP B (A) SPEED CONTROLLER to MAN and zero the demand signal. _____
4. VERIFY OPEN 1CE-268 (1CE-227), CONDENSATE BOOSTER PUMP B (A) DISCHARGE. _____

5.6.2 Procedural Steps (continued)

NOTE: Computer points listed in Section 6.0 of this procedure may be monitored for information.

NOTE: When the Condensate Booster Pump control switch is placed to the START position, the Aux Lube Oil Pump will start and supply the VSF Coupling with oil until oil pressure is greater than or equal to 10 psig as indicated on PI-01LO-2304B(A), at which time the Condensate Booster Pump starts.

CAUTION

The amount of time the associated recirc valve, 1CE-261 (1CE-220) is open, should be minimized due to lack of lubrication without Condensate Booster Pump running.

5. PLACE the control switch CONDENSATE BOOSTER PUMP B (A) RECIRC, 1CE-261 (1CE-220) in the OPEN position immediately prior to starting Condensate Booster Pump B (A). _____

NOTE: Starting the second Condensate Booster Pump may cause the previously running pump controller to reject to Manual. This is due to the speed sensor on the pump being started initially providing a speed input signal that is based on electrical noise. If the running CBP controller rejects to manual, it is permissible to return the controller to Auto once the CBP being started reaches the no-load speed. If the controller again rejects to manual, then further investigation would be required.

6. START B (A) Condensate Booster Pump. _____

7. Locally VERIFY Condensate Booster Pump B (A) Aux Lube Oil Pump has stopped. _____

8. CHECK differential pressure across the Pall Replaceable Duplex Filter, as indicated between PI-01LO-2304B1 and PI-01LO-2304B2 (PI-01LO-2304A1 and PI-01LO-2304A2) is less than 15 PSI (less than 9 PSI when oil temperature has warmed up to normal). _____

9. IF differential pressure across the Pall Replaceable Duplex Filter is greater than or equal to 15 PSI,
THEN SWAP to the idle/out of service filter per Section 8.15 (greater than or equal to 9 PSI when oil temperature has warmed up to normal). _____

Op Test No.: NRC	Scenario # 5	Event # 1	Page 64 of 78
Event Description:	OP-134 Section 5.6 – Second Condensate Booster Pump Start Up		
Time	Position	Applicant's Actions or Behavior	

5.6.2 Procedural Steps (continued)

10. **SLOWLY INCREASE** the demand signal on PK-2308 (PK-2307) CNDST BSTR PUMP B (A) SPEED CONTROLLER to match the demand signal on the previously running Condensate Booster Pump Speed Controller. _____

11. **WHEN** the demand signals are matched,
THEN PLACE PK-2308 (PK-2307) CNDST BSTR PUMP B (A) SPEED CONTROLLER to AUTO. _____

12. **PLACE** the control switch for CONDENSATE BOOSTER PUMP B (A) RECIRC, 1CE-261 (1CE-220) in the MODU position. _____

13. After 5 to 10 minutes of running, **VERIFY** the VSF coupling oil level is in the normal operating range. _____

EIR Number: _____
W/O Number: _____
Clearance Number: _____

1. OWP - RP-06

2. System: Reactor Protection

3. Component: B SG LEVEL

4. Scope: LCO action required due to inoperable SG B narrow range level protection channel I (LI-01FW-0484), II (LI-01FW-0485), III (LI-01FW-0486), or IV (LI-01FW-0493).

5. Applicable Requirements: 3.3.1 (Modes 1 and 2), 3.3.2 (Modes 1, 2, and 3) and 3.3.3.6 (Modes 1, 2, and 3)

6. Precautions: 1) To prevent a Reactor Trip insure only one channel is taken out of service at a time, by verifying corresponding Trip Status Lights for the other channels are de-energized. 2) Both associated SF/FF mismatch channels including steam flow pressure compensation must remain OPERABLE (FB/488B & FB/488A not tripped) for maintenance on channel I or II. 3) For Maintenance on channel III, SG level must be controlled manually.

7. Component lineup completed per attached sheet(s).
_____ / _____
Signature Date

8. Testing required on redundant equipment while the component is inoperable. None

9. Testing/Action required to restore operability. (N/A if tracked on EIR)

- MST-IO026 for Chan I or
- MST-IO027 for Chan II or
- MST-IO028 for Chan III or
- MST-IO035 for Chan IV
- Channel Check

_____ / _____
_____ / _____
_____ / _____
_____ / _____
_____ / _____
Signature Date

10. Component lineups restored per attached sheet(s).
_____ / _____
Signature Date

11. Remarks: _____

12. Reviewed By: _____ _____
Superintendent - Shift Operations Date

After receiving the final review signature, this OWP becomes a QA RECORD and should be submitted to Document Services.

Bistable/Status Light Lineup

Component ID or Number	Position for Inoperability Initial/Verified		Restored Position Initial/Verified	
B SG LEVEL PROTECTION CHANNEL I (LI-484)				
In PIC 1 on Card C1-861				
NOTE: - The Master Test Switch may be positioned to TEST for troubleshooting. It is not required to be in TEST to meet Tech Specs. Operating this switch before operating the bistable switches aids in troubleshooting by maintaining system conditions the same as they were when the trouble occurred.				
- Concurrent verification is preferred while tripping bistables.				
SW6 (LS/484D) Master Test Switch for LS/484	TEST	____/____	NORMAL	____/____
In PIC 1 on Card C1-829:				
BS1 (LB/484A Low Low Level RX Trip)	TEST	____/____	NORMAL	____/____
BS2 (LB/484B Low Level for SF/PP Mismatch RX Trip)	TEST	____/____	NORMAL	____/____
BS3 (LB/484C for P-14)	TEST	____/____	NORMAL	____/____
On TSLB-2 (Check the following):				
SG B LO LO LVL LB 484A (Window 5-1)	ENERGIZED	____/____	DE-ENERGIZED	____/____
SG B LO LVL LB 484B (Window 2-1)	ENERGIZED	____/____	DE-ENERGIZED	____/____
SG B HI HI LVL LB 484C (Window 8-1)	ENERGIZED	____/____	DE-ENERGIZED	____/____

Bistable/Status Light Lineup

Component ID or Number	Position for Inoperability Initial/Verified		Restored Position Initial/Verified	
B SG LEVEL PROTECTION CHANNEL II (LI-485)				
In PIC 2 on Card C2-861				
NOTE: The Master Test Switch may be positioned to TEST for troubleshooting. It is not required to be in TEST to meet Tech Specs. Operating this switch before operating the bistable switches aids in troubleshooting by maintaining system conditions the same as they were when the trouble occurred.				
Concurrent verification is preferred while tripping bistables.				
SW6 (LS/485D) Master Test Switch for LS/485	TEST	____/____	NORMAL	____/____
In PIC 2 on Card C2-829:				
BS1 (LB/485A Low Low Level RX Trip)	TEST	____/____	NORMAL	____/____
BS2 (LB/485B Low Level for SF/FF Mismatch RX Trip)	TEST	____/____	NORMAL	____/____
BS3 (LB/485C for P-14)	TEST	____/____	NORMAL	____/____
On TSLB-2 (Check the following):				
SG B LO LO LVL LB 485A (Window 5-2)	ENERGIZED	____/____	DE-ENERGIZED	____/____
SG B LO LVL LB 485B (Window 2-2)	ENERGIZED	____/____	DE-ENERGIZED	____/____
SG B HI HI LVL LB 485C (Window 8-2)	ENERGIZED	____/____	DE-ENERGIZED	____/____
On Main Control Board:				
CAUTION				
Prior to placing the SG LVL ATWS panel bypass switch to normal, verify the A and B train trouble lights and the A and B train trip lights are not lit on the AMSAC panel.				
SG LVL ATWS PANEL BYPASS Switch	BYPASS	____/____	NORMAL	____/____

Bistable/Status Light Lineup

Component ID or Number	Position for Inoperability Initial/Verified		Restored Position Initial/Verified	
B SG LEVEL PROTECTION CHANNEL III (LI-486)				
In PIC 3 on Card C3-861				
NOTE: The Master Test Switch may be positioned to TEST for troubleshooting. It is not required to be in TEST to meet Tech Specs. Operating this switch before operating the bistable switches aids in troubleshooting by maintaining system conditions the same as they were when the trouble occurred. Concurrent verification is preferred while tripping bistables.				
SW6 (LS/486B) Master Test Switch for LS/486	TEST	____/____	NORMAL	____/____
In PIC 3 on Card C3-829:				
BS1 (LB/486A Low Low Level RX Trip)	TEST	____/____	NORMAL	____/____
BS2 (LB/486C for P-14)	TEST	____/____	NORMAL	____/____
On TSLB-2 (Check the following):				
SG B LO LO LVL LB 486A (Window 5-3)	ENERGIZED	____/____	DE-ENERGIZED	____/____
SG B HI HI LVL LB 486C (Window 8-3)	ENERGIZED	____/____	DE-ENERGIZED	____/____
On Main Control Board:				
FK-488 (Main FW Reg. Valve B Controller)	MANUAL	____/____	AUTO/MANUAL	____/____
FK-489.1 (Main FW Bypass Valve B Controller)	MANUAL	____/____	AUTO/MANUAL	____/____

Bistable/Status Light Lineup

Component ID or Number	Position for Inoperability Initial/Verified	Restored Position Initial/Verified
B SG LEVEL PROTECTION CHANNEL IV (LI-483)		
In PIC 4 on Card C4-863		
NOTE: The Master Test Switch may be positioned to TEST for troubleshooting. It is not required to be in TEST to meet Tech Specs. Operating this switch before operating the bistable switches aids in troubleshooting by maintaining system conditions the same as they were when the trouble occurred.		
Concurrent verification is preferred while tripping bistables.		
SW2 (LS/483B) Master Test Switch for LS/483	TEST _____/_____	NORMAL _____/_____
In PIC 4 on Card C4-846:		
BS1 (LB/483A for P-14)	TEST _____/_____	NORMAL _____/_____
On TSLB-2 (Check the following):		
SG B HI HI LVL LB 483A (Window 8-4)	ENERGIZED _____/_____	DE-ENERGIZED _____/_____

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 1 of 8
Safeguards Actuation Verification

NOTE

- General guidance for verification of safeguards equipment is contained in Attachment 4 of this procedure.
- ERFIS displays of safeguards equipment status are not reliable while any associated safety-related electrical buses are de-energized.

☐ 1. Verify Two CSIPs - RUNNING

☐ 2. Verify Two RHR Pumps - RUNNING

☐ 3. Verify Two CCW Pumps - RUNNING

☐ 4. Verify All ESW **AND** ESW Booster Pumps - RUNNING

☐ 5. Verify SI Valves - PROPERLY ALIGNED

(Refer to Attachment 1.)

☐ 6. Verify CNMT Phase A Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 4.)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 2 of 8
Safeguards Actuation Verification

☐ 7. Verify SG Blowdown **AND** SG Sample Isolation Valves In Table 1 - SHUT

Table 1: SG Blowdown And Sample Isolation Valves

Process Line	Outside CNMT (MLB-1A-SA)	Inside CNMT (MLB-1B-SB)
SG A Sample	1SP-217	1SP-214/216
SG B Sample	1SP-222	1SP-219/221
SG C Sample	1SP-227	1SP-224/226
SG A Blowdown	1BD-11	1BD-1
SG B Blowdown	1BD-30	1BD-20
SG C Blowdown	1BD-49	1BD-39

8. **IF** Main Steam Line Isolation Actuated **OR** Is Required By Any Of The Following, **THEN** Verify MSIVs **AND** MSIV Bypass Valves - SHUT

☐ • Steam line pressure - LESS THAN 601 PSIG

☐ • CNMT pressure - GREATER THAN 3.0 PSIG

9. **IF** CNMT Spray Actuation Signal Actuated **OR** Is Required, **THEN** Verify The Following:

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 9.)

☐ • CNMT spray pumps - RUNNING

☐ • CNMT spray valves - PROPERLY ALIGNED

☐ • Phase B isolation valves - SHUT

☐ • All RCPs - STOPPED

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 3 of 8
Safeguards Actuation Verification

☐ 10. Verify Both Main FW Pumps - TRIPPED

☐ 11. Verify FW Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 6.)

☐ 12. Verify both MDAFW pumps - RUNNING

13. IF any of the following conditions exist, THEN verify the TDAFW pump - RUNNING

☐ • Undervoltage on either 6.9 KV emergency bus

☐ • Level in two SGs - LESS THAN 25%

☐ • Manual actuation to control SG level

14. Verify AFW Valves - PROPERLY ALIGNED

☐ • IF no AFW Isolation Signal, THEN verify isolation and flow control valves - OPEN

NOTE

An AFW Isolation signal signal requires a Main Steam Line Isolation coincident with one SG pressure 100 PSIG below the other two SGs.

☐ • IF AFW Isolation Signal present, THEN verify MDAFW and TDAFW isolation and flow control valves to affected SG - SHUT

☐ 15. Verify Both EDGs - RUNNING

☐ 16. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 4 of 8
Safeguards Actuation Verification

☐ 17. Verify CNMT Ventilation Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 7.)

☐ 18. Verify Control Room Area Ventilation - MAIN CONTROL ROOM ALIGNED FOR EMERGENCY OPERATION

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 5, Sheets 1 and 2, Sections for MAIN CONTROL BOARD, SLB-5 and SLB-6.)

19. Verify Essential Service Chilled Water System Operation:

☐ • Verify both WC-2 chillers - RUNNING

☐ • Verify both P-4 pumps - RUNNING

☐ (Refer to AOP-026, "LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM" for loss of any WC-2 chiller.)

20. Verify CSIP Fan Coolers - RUNNING

☐ AH-9 A SA
☐ AH-9 B SB
☐ AH-10 A SA
☐ AH-10 B SB

NOTE

Security systems are powered by bus 1A1 (normal supply) or bus 1B1 (alternate supply). Backup power will be available for approximately 30 MINUTES after the supplying bus is de-energized. (Refer to OP-115, "CENTRAL ALARM STATION ELECTRICAL SYSTEMS", Section 8.9 and 8.10.)

☐ 21. Verify AC buses 1A1 **AND** 1B1 - ENERGIZED

☐ 22. Place Air Compressor 1A **AND** 1B In The LOCAL CONTROL Mode.

(Refer to Attachment 7.)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 5 of 8
Safeguards Actuation Verification

CAUTION

The maximum calculated dose rate in the vicinity of MCC 1A35-SA and MCC 1B35-SB is between 10 MREM/HR and 150 MREM/HR.

☐ 23. Dispatch An Operator To Unlock **AND** Turn ON The Breakers For The CSIP Suction **AND** Discharge Cross-Connect Valves:

(Refer to Attachment 2.)

MCC 1A35-SA		MCC 1B35-SB	
VALVE	CUBICLE	VALVE	CUBICLE
1CS-170	4A	1CS-171	4D
1CS-169	4B	1CS-168	7D
1CS-218	14D	1CS-220	9D
1CS-219	14E	1CS-217	12C

24. Check If C CSIP Should Be Placed In Service:

☐ • **IF** two charging pumps can **NOT** be verified to be running, **AND** C CSIP is available, **THEN** place C CSIP in service in place of the non-running CSIP using OP-107, "CHEMICAL **AND** VOLUME CONTROL SYSTEM, Section 8.5 or 8.7.

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 6 of 8
Safeguards Actuation Verification

25. Start The Spent Fuel Pump Room Ventilation System:

    a. At AEP-1, verify the following ESCWS isolation valves - OPEN

        1) SLB-11 (Train A)

        ☐ • AH-17 SUP CH 100 (Window 9-1)

        ☐ • AH-17 RTN CH 105 (Window 10-1)

        2) SLB-9 (Train B)

        ☐ • AH-17 SUP CH 171 (Window 9-1)

        ☐ • AH-17 RTN CH 182 (Window 10-1)

    b. At AEP-1, start one SFP PUMP ROOM FAN COOLER:

    ☐ • AH-17 1-4A SA

    ☐ • AH-17 1-4B SB

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 7 of 8
Safeguards Actuation Verification

NOTE

- Fuel pool levels **AND** temperatures should be monitored approximately every 1 to 2 HOURS.
- Following the initial check of fuel pool levels and temperature, monitoring responsibilities may be assumed by the plant operations staff (including the TSC or STA).
- Only fuel pools containing fuel are required to be monitored.

26. Check Status Of Fuel Pools:

☐ a. Operate spent fuel cooling pumps to maintain fuel pool temperatures between 85° F and 105° F.

b. Monitor fuel pool levels **AND** temperatures:

☐ • Refer to AOP-041, "SPENT FUEL POOL EVENT" Attachments 7, 8, 9, 10 and 11 for SFP parameter monitoring methods.

☐ • Refer to Curves H-X-24, H-X-25 and H-X-26 for SFP time to 200° F.

☐ • Levels - GREATER THAN LO ALARM (284 FT, 0 IN)

☐ • Temperatures - LESS THAN HI TEMP ALARM (105° F)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 8 of 8
Safeguards Actuation Verification

NOTE

IF control room ventilation was previously aligned to an emergency outside air intake for post-accident operations, **THEN** follow-up actions will be required to restore the alignment.

27. Consult Plant Operations Staff Regarding Alignment Of The Control Room Ventilation System:

☐ • Site Emergency Co-ordinator - Control Room

☐ • Site Emergency Co-ordinator - Technical Support Center

(Refer to PEP-230, "CONTROL ROOM OPERATIONS".)

- END -

Rev. 1

Revised per NRC comments provided on 75 day outline submittal.

Archie Lucky 6/23/2013

Rev. 2

Revised per Operations validation comments.

Archie Lucky 7/02/2013